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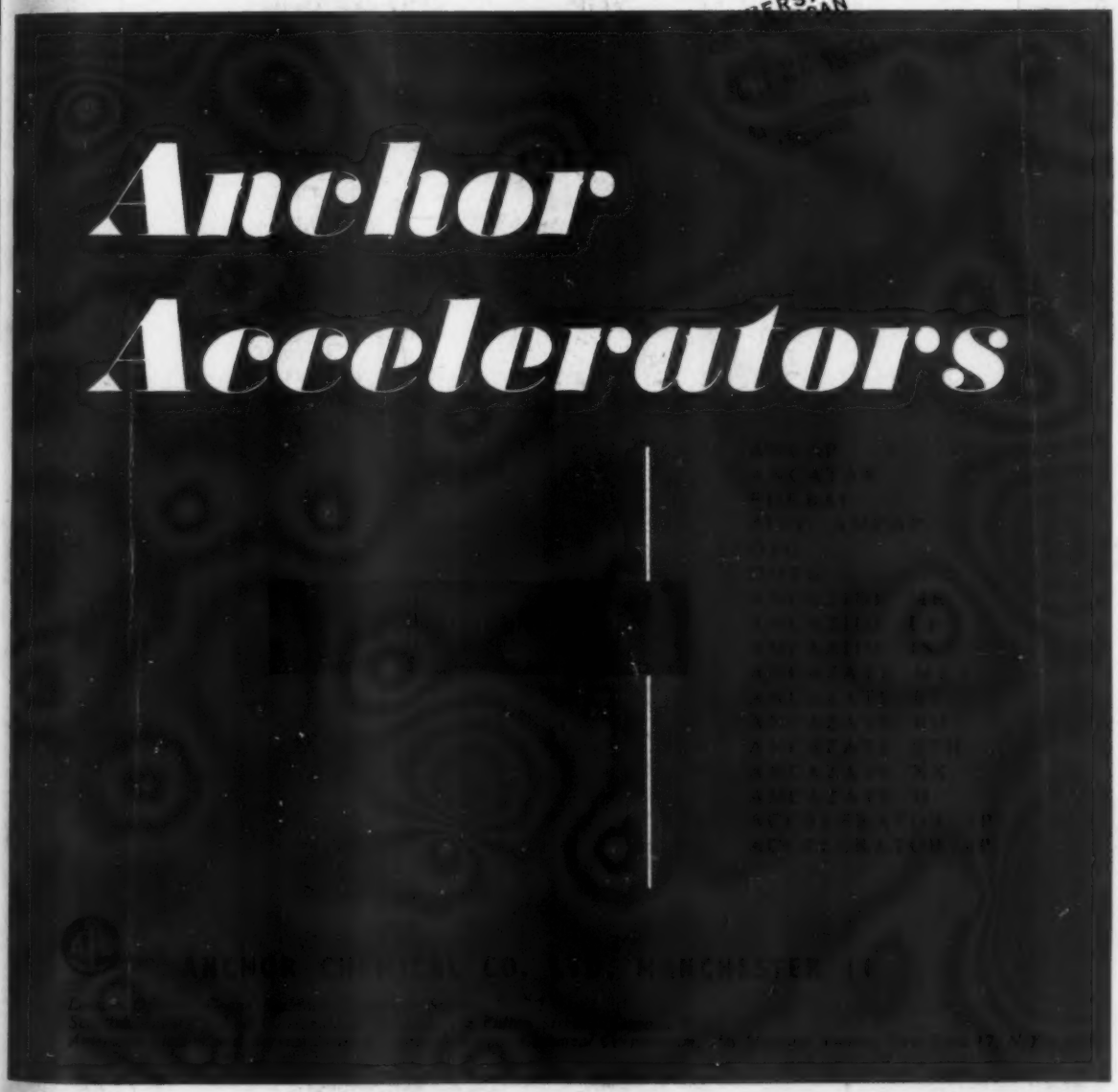

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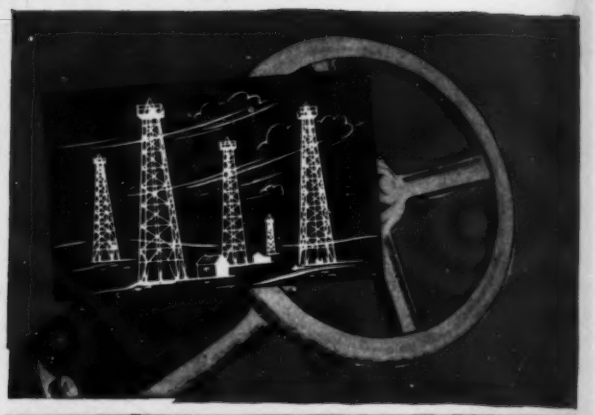
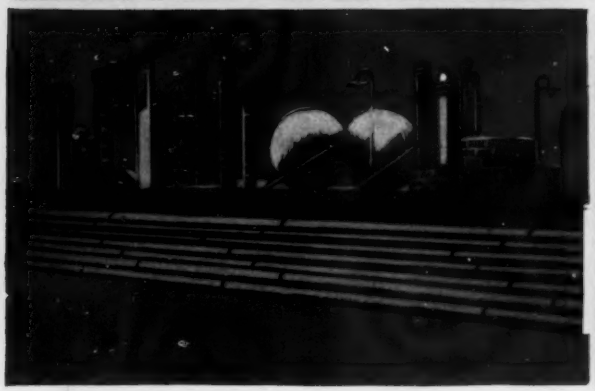

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IN ITS 75th YEAR

June 6 1959

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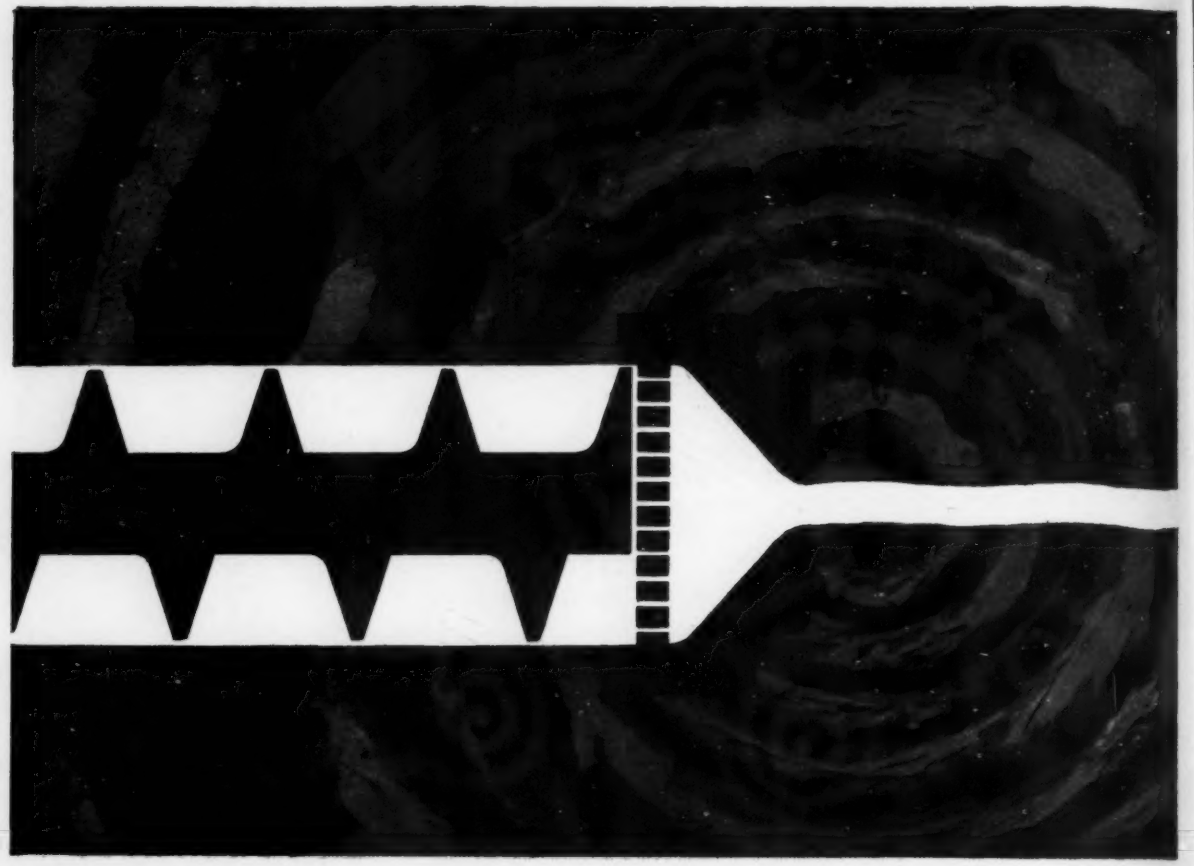

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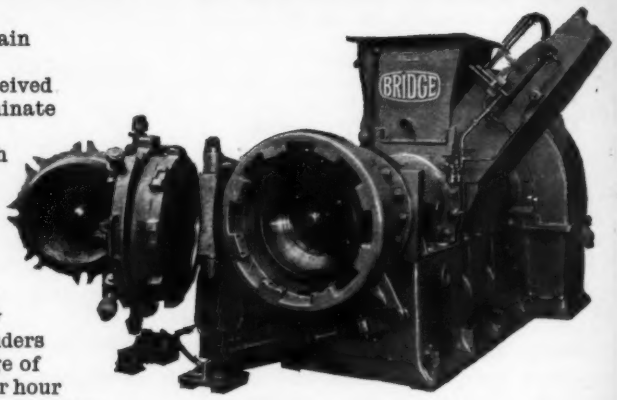

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NOTES of the WEEK

Plastics Exhibition

THE tremendous versatility of the plastics industry looks like being well demonstrated at the International Plastics Exhibition to be held at Olympia, London, from June 17 to 27. It is understood that the Exhibition will be not only the largest of its kind ever staged in this country, but the largest anywhere under one roof. Every aspect of the industry, from industrial and domestic finished products to new materials and new equipment, will be on show on the stands of the approximately 300 UK and foreign exhibitors. The Convention, to be held concurrently with the Exhibition, promises also to hold great interest. Papers (summaries of which have appeared in *RJIP* over the past weeks) will be given on a wide range of subjects by speakers from many countries.

Dollar Trade

WITH effect from next Monday the controls on the import of many consumer goods from the Dollar Area will be removed. Included among the principal items are goods manufactured from plastics materials and rubber manufactures, including tyres and tubes. One effect of this move is that importers and consumers in the UK will be able to enjoy the benefit of competition between a greater number of overseas suppliers, those in Europe now being joined on level terms by Canadian, US and other Dollar Area exporters. It is interesting to note, in passing, that the UK now has a favourable balance of trade with the US for the first time since 1865.

Terms of Employment

THE Terms and Conditions of Employment Act, 1959, which received the Royal Assent on April 30, came into operation on May 30. This measure was originally introduced as the Wages Councils (Amendment) Bill, and the title was changed when it was amended during committee in the House of Commons to incorporate a new Section to provide for the determination of ' claims ' that a particular employer was not observing recognized terms and conditions of employment. Cases of this kind had previously been dealt with under the name of ' issues ' by the Industrial Disputes Tribunal, which was abolished on March 1 this year. The central purpose of the new Section to the Act, in which the term ' issue ' is replaced by that of ' claim ' is to give representative organizations of employers, or of workers, the statutory right to invoke, through the Minister of Labour and National Service, the adjudication of the Industrial Court in cases where it appears that an employer is not observing the recognized terms and conditions of employment in his particular trade or industry, or section of trade or industry.

Bulge Training

THE Industrial Training Council met last week to consider the Government's proposed grant-in-aid of £75,000, the main purpose of which is to accelerate the expansion of apprenticeship and other industrial training for young people in the exceptional circumstances created by the ' bulge ' in school-leavers in 1961, 1962 and 1963. This aid is to be matched by contributions from industry of at least the same amount. The Council decided to accept the Government's proposal. It will write to all employers' organizations which are directly concerned with the negotiation of wages and working conditions, asking whether they wish to apply for financial aid out of the grant towards the appointment of training development officers either by the organizations or by joint industrial councils or similar bodies in their industries. The job of these officers will be to stimulate and assist in the setting up or extension of training schemes for young people by employers, either individually or through joint schemes.

Careers Exhibition

THE amount of time spent by the Queen and the Duke of Edinburgh on the stand of the Federation of British Rubber and Allied Manufacturers at the Education and Careers Exhibition demonstrated that the fascination which the workings of the industry exert on so many was not confined to the thousands of girls and boys—to say nothing of careers masters—who thronged the FBRAM stand up to closing time yesterday evening. It must be a source of great satisfaction to the federation that their far-sighted move in taking stand space should have proved so successful.

Printing Trade Dispute

As a consequence of the wage dispute in the printing trade, certain production difficulties have arisen. The printers of *RJIP* are involved and we would ask the indulgence of readers and advertisers for any delay or other inconveniences that may arise due to circumstances beyond our control.

NEWS *Briefs*

CANADIAN GOODYEAR EXPANSION — PERUVIAN RUBBER — AUSTRALIAN PLASTICS — INDIAN IMPORT LICENCES — ISRAELI TYRE OUTPUT

●**Canada**—T. M. Mayberry, president of Firestone Tire and Rubber Company of Canada, has announced plans to establish a new tyre manufacturing plant in Western Canada. The new plant, Mr. Mayberry said, is part of an $8,000,000 to $10,000,000 expansion programme of the company which also includes additions and improvements to the present Hamilton, Ontario, installation. He added that studies are under way to determine if a 50-acre site in Calgary, Alberta on which an option has been taken meets all the necessary requirements.

●**United States**—Development of a new de-watering process for both natural and synthetic rubber is announced by the Flintkote Co., New York. Mr George J. Pecaro, chairman of Flintkote, said the new process was available for licensing through the Patent Licensing Corporation — a wholly-owned subsidiary of Flintkote. The process eliminated the need for costly drying and cleaning equipment and would result in substantial processing economies. Mr Pecaro said rubber could be mixed and dried in one operation for the first time by using a special mixer equipped to remove water from the raw rubber.

●**Malaya**—Mr K. T. Soh, chairman of the Singapore Rubber Goods Manufacturers' and Traders' Association, said in Singapore recently that Japan was making inroads into Malaya's rubber shoe markets in Africa and the Middle East. Mr Soh said Japanese quotations for shoes in these markets were 20% below those of Malayan products. 'This is serious for our trade,' he said. Malaya had formerly exported more than 200,000 pairs of shoes a year to Africa and the Middle East, he said, but recently this figure had dropped to 60,000 or 70,000.

●**India**—The Indian Government has decided to issue supplementary licences for imports of tyres and tubes for trucks and bicycles of all sizes during the licensing period April-September 1959. This was announced in an Import Trade Control public notice. The supplementary licences will be granted to established importers for a value equal to one-fifth of the face-value of the basic quota licences issued to them for the current licensing period. Applications for supplementary licenses may be made in the prescribed form to the licensing authorities at the ports before June 30 1959, the announcement added.

●**United States**—The US Commerce Department has announced that it had approved licences to export $6.6m. worth of goods to the European Soviet block in the first three months of 1959, but rejected applications for permits to ship another $15.4m. worth of goods. The rejected applications had called for the shipment of, among other things, synthetic rubber.

●**Canada** — Goodyear Tire and Rubber Co. of Canada, plans to build a $7,000,000 plant in Western Canada, the president, L. E. Spencer, of Toronto, said recently. The location would be decided 'within the next year.' Mr Spencer said car, truck and farm tyres would be manufactured in the plant, which would employ about 300 persons. The plant would supply dealers from the Lakehead to the West Coast.

●**United States**—The Firestone Tire and Rubber Co. and the United Rubber Workers' Union will meet with a Federal mediator on June 3 in an effort to resolve a seven-week old strike. Some 18,000 workers at Firestone have been on strike over fringe benefits since April 16. Another 14,000 workers are striking at B. F. Goodrich Co. This company and the Union continued negotiations today. The Federal Mediation and Conciliation Service said yesterday that it had a plan under consideration to try to settle this strike as well.

●**Australia**—A West Australian firm, Moulded Products (WA) Pty. Ltd., will start producing plastic hose and waterpiping at Osborne Park shortly. The company has taken over a factory in Howe Street, Osborne Park, from Westralian Plastics Ltd.

●**Peru**—A law has been submitted to the Peruvian Senate, calling for the reorganization of the Peruvian Amazon Corporation. This corporation was established to exploit the national resources of the western part of the country, and consequently 80% of the unemployed population in the Loreto and Madre de Dios regions obtained work in collecting natural rubber — the corporation providing money, materials and articles of prime necessity. Despite this, between 1951 and 1958, Peru imported 4.4 million tons of natural rubber worth $62 million, as well as 866 thousand kilos of synthetic rubber worth $11.3 million.

●**Israel** — Plans for the immediate doubling of the production capacity at the Alliance tyre plant in Israel were recently announced by the company's president, Mr Arthur Taubman, who predicted that with an additional $2 to $2.5 million, the factory would soon be manufacturing 7,500 tons of rubber products per annum, as compared to 4,200 tons last year. The firm exported nearly IL 10 million worth of tyres in 1958.

●**Timor** — Exports of rubber from Timor during 1958 amounted to 2.9 million escudos.

●**Colombia**—The Colombian Cabinet was recently reported to be studying the possibility of permitting duty-free imports of rubber and other raw materials used for the production of tyres.

'I found out what causes our broken joints—it's gravity!' — 442

IRI FOUNDATION LECTURE 1959

Co-operative Research and the Rubber Industry

By J. R. SCOTT

(*Summary of the Lecture delivered in London on May 29*)

CO-OPERATIVE research has been organized on a big scale both by the plantation industry and by the rubber manufacturing industry in the United Kingdom. The planters were the first to adopt the co-operative plan, research chemists being appointed in Ceylon and Malaya as early as 1909; this was the pioneer research activity in the rubber plantation industry.

In 1913-15 the Ceylon Rubber Research Scheme and corresponding organizations in Sumatra and Java were established on the basis of the now familiar Research Association plan, that is, voluntary subscriptions from interested companies plus a Government grant. The first world-war unfortunately delayed similar moves in Malaya, and plans for the Rubber Research Institute did not take shape until 1925.

These research organizations were largely concerned with increasing the yields of plantation rubber, but when around 1922 restriction of output became necessary it was realized that funds should be devoted also to research into extended uses. Starting in 1931 with an annual grant of £10,000 from the Federated Malay States and Straits Settlements Governments, and this eventually resulted in the formation of the International Rubber Research Board and the research centres in the Netherlands, France, and the United Kingdom; the Rubber Stichting, Institut Français du Caoutchouc and the British Rubber Producers' Research Association, all financed from the cess on raw rubber exports from Far Eastern countries.

The DSIR Scheme

Meanwhile in 1917 the Industrial Research Association Scheme had been established in the United Kingdom by the Department of Scientific and Industrial Research, and several industries including rubber manufacture took prompt advantage of this. The Research Association of British Rubber and Tyre Manufacturers, to use its original name, was officially registered on September 30 1919. It is interesting incidentally to find that these industries included several old craft industries like textiles, leather, footwear, iron and non-ferrous metals.

The original DSIR Research Association Scheme was based on the view that Government support, in the form of a financial grant, would be needed only in the early years after which industry would bear the full cost. Perhaps because the industrialist was not quite so quickly convinced of the value of co-operative research, grants were, in fact, continued and it has now become the accepted view that Government support should in the national interest be a continuing feature of the Research Association Scheme. This seems logical because the research associations have obligations to serve the community as well as the immediate interests of Member firms.

Research Association Development and Finance

A comparison of income levels of research associations around 1924-25 with present-day levels shows there has been a striking increase, even after adjusting for the fall in the value of the pound. Present levels are anything from 2½ to nine times the adjusted 1924-25 figures, the ratio for RABRM being around 4½. This is indeed evidence of a new appreciation of the importance of research for industry. On the other hand it seems clear that in the early years there was insufficient experience to judge the scale on which co-operative research must be undertaken in order to be vigorous and successful, and perhaps in consequence the number of research associations fell slightly during the succeeding years 1924-28.

However, the years 1929-42 witnessed a steady though slow increase in the number of research associations, and world war two like its predecessor caused a further spate of research association formation, the number being practically doubled (to 43) by 1950.

Parallel with this increase in the number of research associations has been a steady and encouraging increase in their average income, even after allowing for changes in the value of the pound. The income of RABRM has followed a similar upward trend though at a somewhat lower level than the average. However, averages may be deceptive when the individual values vary as widely as they do among the 46 existing research associations, whose industrial incomes range from some £5,000 to £500,000. On a size distribution chart indeed, RABRM, with a total industrial income in 1958 of about £70,000 corresponds to the most usual level of RA income and hence is about 'average' in this sense.

Research Funds and Industrial Output

Another relevant question about research association incomes is whether the increased support from industry has been just a reflection of the growth of output, or whether the ratio of research association income to output has increased. A study of the relevant data shows that the ratio has, in fact, increased, though for the rubber industry the increase so far is rather less (in the ratio of about 2:1) than for industry in general (about 3:1).

The position of the rubber industry relative to others is confirmed by considering the present ratios (of research association income to industrial output) for various industries or industry groups. Again the rubber industry appears hitherto to have been somewhat below the average. However, the Council's plans for RABRM envisage a substantially increased income for 1959 onwards, and if the support from industry enables this target to be reached, RABRM will come up to about the general average.

Government Support

The above observations relate to income from industry but the Government grant constitutes a very useful supplement to this, and

RABRM fares at least as well in this respect as research associations in general. The Government, moreover, makes an almost equal contribution in the income tax relief on subscriptions to research associations; thus in total the Government provides just over half the income of RABRM whilst the net cost to industry is about one-third, the actual figures being 55% and 34% respectively in 1958, or 54% and 38% according to the 'target' budget for 1959.

John Richard Scott, born in Leeds, January 19 1900. Studied chemistry at the University of Leeds, graduating B.Sc. with First Class Honours in 1921. He was awarded the Sir Swire Smith Research Fellowship and spent two years on research in organic chemistry under the late Professor J. B. Cohen, leading to the award of Ph.D. Joined the Research Association of British Rubber and Tyre Manufacturers (as it then was) in October 1923 as physical chemist and later took charge of the mill room and physical testing section. On the death of Mr B. D. Porritt in 1940 he became Acting Director of Research and was appointed Director of Research in 1945; in November 1958 he retired from that position and has since acted as Scientific Adviser to the RABRM.

J. R. SCOTT

Apart from his work for the Research Association, Dr Scott has for many years been an active worker for the Institution of the Rubber Industry, especially in connexion with the diploma scheme, and was awarded the Colwyn Medal of the Institution in 1948. He has also long taken an active interest in the work of the British Standards Institution and the International Organization for Standardization, and has led the United Kingdom delegation to all the meetings of the ISO Rubber Committee. Dr Scott has many other links with various activities in the rubber industry, notably as a Governor of the National College of Rubber Technology since its foundation and a member of the Technical Committee of the Federation of British Rubber and Allied Manufacturers.

Location of Research Associations

The choice of the ideal location for a research association, having regard both to the convenience of Member firms and of the association's staff, is a matter calling for careful thought especially where, as with the rubber industry, there is not one predominant centre. The choice in such cases has often been the London area, but locations in the provinces can have the advantage of being nearer to the 'centre of gravity' of the industry. Such is the case with RABRM; a study of the distribution of output of the rubber industry shows some 80% to be disposed near a line joining London and Glasgow, that is in the London area, West Midlands, Lancashire and central Scotland. The centre of gravity is roughly at Stafford, only 25 miles from Shawbury, which is thus much more central than the old headquarters at Croydon.

Research Problems: Fundamental and Applied

A major question in framing a research association's programme, apart from the fact of always having too many problems, is the balance between long - term fundamental researches and the short-term 'down to earth' problems that appeal to most members. In fact the two are inseparable, since the fundamental knowledge, quite apart from the chance (admittedly rare) of leading to a big break-through, provides the necessary background for dealing with immediate factory problems. Indeed it is likely that ultimately the greatest contribution that a research association makes to industry is by steadily and imperceptibly adding to the general body of knowledge that technologists throughout the industry continually use in dealing with a thousand and one problems, though probably without ever realizing where that knowledge has come from.

It is the experience of RABRM that the major fundamental research projects originate with the research staff, whilst the problems from the industry are generally those relating to some specific product. Indeed some of the most successful of recent RABRM researches, such as those on rubber - textile adhesion, dynamic properties, and operational research have resulted from getting a first-class worker on the job and letting him follow his own ideas.

Raw Materials Research

As the first example of a subject particularly suited to a research association, the study and evaluation of raw materials is mentioned; their enormous number and variety and their very great monetary value (well over £100,000,000 annually) being sufficient to justify this being a priority item.

RABRM has studied and reported on something like 500 different materials—rubbers, fillers, reinforcing agents, softeners, accelerators, anti-oxidants, etc., including about 80 synthetic rubbers ranging from the very earliest types to the latest fluorine polymers.

The knowledge thus disseminated about raw materials and the compounding advice RABRM is able to give on the basis of this knowledge, are encouraging and helping the industry to take prompt advantage of new polymers and compounding materials, and have similarly helped in the past to familiarize the industry with such essential materials as organic accelerators and anti-oxidants.

A special aspect of this work related to the war-time shortages, when RABRM demonstrated in particular how to use waste vulcanized rubber to the best advantage as reclaim or ground scrap—work of permanent value for economical compounding, and also the possibilities of extenders, now used on an enormous scale in oil-extended synthetics.

Testing Methods

Studies relating to physical testing and chemical analysis form another subject particularly appropriate to a research association. Here again RABRM has made many important advances, of which may be mentioned the streamlining of tensile test procedure, using the electronic test machine with automatic load and extension recording, and the measurement of hardness, where the Association's work, starting from fundamental theory, has led to the development of test procedures now adopted by the British Standards Institution, the International Organization for Standardization, and the American Society for Testing Materials.

The design and production of British rubber testing equipment to replace earlier American and German models owes much to RABRM, which has also pioneered the study of the significance of test results and the magnitude and sources of testing errors in both rubber and textiles.

Standards and Specifications

The standardization of rubber test-

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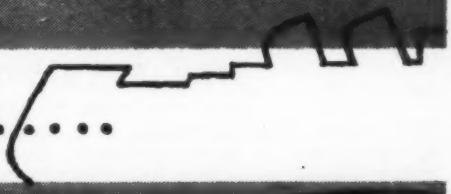
HIGH AND LOW VOLTAGE CABLES.....



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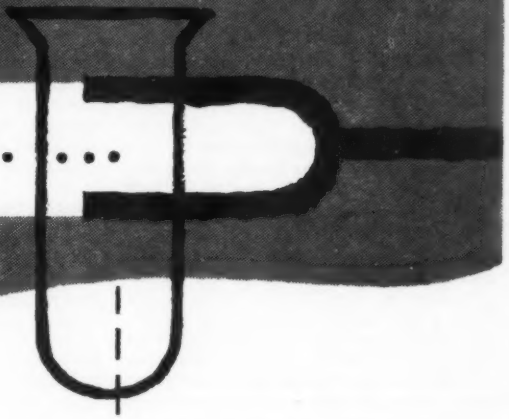

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A Time of Change

FBRAM PRESIDENT'S TERM OF OFFICE REVIEW

IN a review of his two years of office as president of the Federation of British Rubber and Allied Manufacturers, presented to the Council on May 28, Mr Jasper Frankenburg, chairman of Greengate and Irwell Ltd., said:

'My predecessor, Mr Reay Geddes, began his review dated June 1957 by saying: "The main influence at work in the past two years has been the sharpening of competition, as a result partly of normal economic forces and partly of government policies." Among these Mr Geddes instanced the credit squeeze, the special restraints on the motor industry, the cuts in government expenditure, the Restrictive Trade Practices Act, and the prospect of industrial free trade in Europe. These influences have continued through most of my period of office. The results have been obvious to everyone in the trade, and need no illustration here.

'Today the situation has not appreciably changed. Some of the influences which Mr Geddes instanced are indeed still with us. The European Free Trade Area which seemed a hopeful possibility two years ago has not developed as was at one time expected, and at the moment further liberalization of trade does not seem likely in the immediate future. Our initial disappointment will probably be offset by the expansion in our internal economy which it is the government's policy to promote, but we do not yet know to what extent the progressive formation of the Common Market in Western Europe will affect the unstable patterns of international trade.

'Meanwhile our industry is already launched on a period of change; and we must learn to accept change, to work with it and not against it, to turn it to our own advantage and the advantage of the community which we serve.

Effective Competition

'We have always been a competitive industry, and it is essential for us to remain fully and keenly competitive. But to be effective competition does not necessarily mean every man for himself. It is at its most fruitful when it works within a framework of friendship and co-operation. Indeed if we are to remain fully competitive in face of a growing challenge from the consolidation of economic forces beyond the Channel, we will need more, not less, co-operation than we have achieved in the past. We will need to spend more, not less, on research, on development, on modernization. Above all, we need to be sure that in our immediate efforts to meet competition both at home and abroad we do nothing to undermine the sound economic basis on which both our individual firms and our industry as a whole must function. An industry which cuts its own throat is no use to itself, and can be a positive menace to the wider economy of the country as a whole.

'In a changed and changing situation the importance of our Federation as an instrument of co-operation grows. Here again it is necessary to work with, rather than against the trend of events, and to maintain a flexible outlook on possible changes both in constitution and in function. Already the work of changing our Articles of Association so that Associate Members could join in our activities has borne fruit. The Federation has been strengthened by the new blood and the new ideas brought forward by those important firms which supply us with an ever-broadening range of raw materials.

British Standards

'With their help the Technical Committee has been pressing forward with its efforts to increase the scope and effectiveness of British Standards in the rubber industry, not only for our own guidance, but in order to take a more active part in the negotiation of international standards. Agreed standards are a valuable safeguard against the debasement of quality which is a danger in fierce competition, and important also as some measure of defence against the flooding of the home market with cheap goods of inferior quality from abroad.

'Nor are we solely concerned with standards for rubber. More and more of our products demand the use of other polymers. Our relations with the British Plastics Federation, particularly through the British Standards Institution, have been complicated by the fact that many of our member firms are now almost as much plastics manufacturers as rubber manufacturers. The Plastics Products Committee has been set up to study questions raised by this situation and to try and work towards some degree of co-operation with the Plastics Federation.

'At the same time a Specification Advisory Committee set up by the Technical Committee is endeavouring to persuade government departments and other industrial firms requiring rubber products to make use of the reliable specifications which have already been drawn up by the BSI, or where none exist to seek the guidance of experienced technologists in rubber manufacturing firms before attempting to draw up specifications of their own.

'We have had some success also in bringing the research organizations connected with our industry into closer liaison with our own Technical Committee and through it with each other. In June of last year the Technical Committee paid a visit to the laboratories of the British Rubber Producers' Research Association at Welwyn, and in March of this year representatives from Welwyn came to Shawbury where the Technical Committee were meeting at the laboratories of the Research Association of British Rubber Manufacturers, and an informal discussion was held during the afternoon. Arrangements have since been made for regular representation of the BRPRA on the Federation's Technical Committee along with the present representative of the RABRM. These contacts, together with the fortunate circumstance that the present Director of Research at Shawbury was himself formerly one of the Principal Scientists at Welwyn, should go a long way towards ensuring that the excellent research facilities which the industry possesses are deployed to the best advantage.

'The Accountants' Committee has done a very important service in revising, extending and improving its very successful book on Costing in the Rubber Industry which had gone out of print. There is no doubt that correct costing is a *sine qua non* of healthy competition, and an honest attempt on the part of all member firms to follow the principles which this booklet sets out with admirable clarity would go a long way towards consolidating that atmosphere of confidence which the Federation has already done so much to build up.

Publicity

'The Publicity Committee has been more than usually active. It has been responsible for the organization and mounting of the Rubber Industry Stand at the National Education and Careers Exhibition which opened at Olympia on May 26 under the auspices of the National Union of Teachers. Simultaneously it has been designing an ambitious display illustrating the production, properties and processing of natural and synthetic rubbers for permanent exhibition in the Science Museum.

'Through the Press Officer it has kept a guiding hand on the special supplements on rubber manufactures which have been issued by *The Times* and *The Financial Times*. A large number of articles dealing with the rubber industry and its products have appeared in other newspapers and journals and many shorter paragraphs on the work of the Federation and its constituent Associations.

'All this has greatly helped the prestige of our industry; and prestige is important. It may be difficult to assess

its value on any particular occasion either in terms of orders in the order book or of profits on the year's transactions. But it nevertheless has a powerful effect on the general goodwill we command in the community at large, on the quality of recruits who seek to enter our employment, on the readiness of our customers to trust our word and listen to our advice, on the confidence which we place in ourselves and each other.

'Prestige on an international plane has also accrued to the Federation and the industry through the publication last summer of our booklet on Natural Rubber Grades and Contracts. This was compiled under the auspices of the Materials Supply Committee, on which the Federation collaborates with the Tyre Manufacturers' Conference. It sets out the procedures which manufacturers are advised to follow when buying their supplies of natural rubber, and urges them to insist that they do in fact receive what they contract for.

'The Export Department of the Federation, under the guidance of the Export Committee, has maintained its quarterly service of classified export statistics together with its weekly bulletin of information on tariffs, quotas, markets and tenders. The compact presentation of these details, collected from a wide range of official sources, relieves the export staffs of individual firms of a great deal of tedious and time-consuming labour. The Export department also acts as a clearing house for enquiries from customers and prospective customers overseas, many of them stimulated by the issue last year of the third edition of the Federation's Directory of British Rubber Manufacturers and Products; and the detailed knowledge of the industry which it has acquired in this work acts as a nucleus for a similar though more informal service to customers in the United Kingdom as well.

Import Policy Study Group

'Complementary to the Export Committee is a new Import Policy Study Group, which has been formed to consider the problem of rubber products from abroad offered for sale in this country at prices with which no home producer, however competent, can possibly compete. Where Commonwealth territories are concerned, there seems little that we can do so long as the present Government policy remains unchanged. Where the goods are of European origin, however, it is possible that the Government may now be willing to give a little more protection against dumping and other forms of unfair trading than was afforded by the Customs Duties Dumping and Subsidies Act of 1957. The task of the Import Policy Study Group is to watch the situation closely and collect, as and when it becomes available, the kind of detailed information which would be needed for the presentation of any particular case.

'At the same time on the home front the Transport Committee has been studying the day-to-day effects of the new railway charges scheme on the freight bills of the industry, and has had some success with a scheme to pool information on specially advantageous rates which individual firms have been able to negotiate in one or other region.

Conclusion

'The industry is extremely lucky that there are so many senior executives who are prepared to give up their time to the work which I have only been able to outline above and is for the benefit of the industry as a whole. I would like to pay the warmest possible tribute on behalf of the whole Federation to the work done by the Federation's Committees.

'The director and his staff after their fourteen years of office have firmly played themselves into control of most of the situations that arise and this has enabled us to call fewer meetings than before. The meetings which have been necessary have also taken shorter time and the reports of the various subcommittees have usually been passed with very little comment. I hope that democratic control of the Federation by its Council has in no way suffered and I would not imagine this to be the case. Members of the industry will naturally wish to give first call on their time to their own firms on whom they depend themselves and on whom, of course, the prestige of the industry depends. The Federation can itself only reflect the position of the industry which it represents.

'As I write this the Federation's members, that is the trade associations of the industry, are considering whether conditions have suitably matured to implement the permissive decisions of 1956 and receive individual firms as members. In view of the fact that this discussion is still *sub judice* it would be improper to discuss it at this moment. It is, however, I am convinced, a sign of the great strength and liveliness of the Federation.

'I must close by congratulating the Federation on its possession of our director and secretary. The all-embracing vision and lively ideas of the director, particularly when kept down to earth by the exactness and attention to the Articles of Association of the secretary, are a great asset. We are extremely lucky in having their support.'

IRI FOUNDATION LECTURE Continued from page 854

ing procedure by the BSI and ISO has received constant help and encouragement from RABRM, which indeed first suggested that British Standard methods should be formulated. Again the tensile and hardness tests afford striking examples of the simplification achieved; in the former case by reducing a bewildering variety of sizes and shapes of dumb-bell test pieces to two only, and in the latter by establishing one scientifically and internationally recognized scale of hardness in place of the previous confusing variety of arbitrary scales.

Nor have RABRM contributions to standardization been limited to test methods. Extensive studies have been made on relevant properties of many manufactured products to provide data for fixing specification limits; these studies drew attention to some quite unbelievable variations in properties that are important to proper functioning.

Operational Research

More recently the emphasis has shifted from studying rubber products to studying the methods of making them, in fact, operational surveys of manufacturing productivity. These have shown, as expected, that the basic operations of mastication and mixing are not in general producing the output of which the plant is capable, and substantial increases in output have been achieved by adopting suggestions resulting from these investigations. These productivity studies, on which a start was made possible by a grant from the US Mutual Security Agency, well illustrate what the research association can do to improve manufacturing processes, a field of investigation which in the writer's opinion offers even greater scope than improvements in the finished products. They show, moreover, how in a research team different scientific skills and different lines of research, ranging in this case from oxidation or rubber chain molecules to mathematical statistics, reinforce each other to produce an outstanding advance.

The most significant changes in the Association's research programme over the years have been those resulting from the introduction of man-made materials; synthetic rubbers and plastics and textile fibres. These trends will undoubtedly continue to grow in importance especially in the direction of extended work on plastics.

In this lecture time has unfortunately not permitted any mention of the many other activities—library, information and enquiry services, liaison visiting and so on, that a research association must undertake to ensure that industry uses the new knowledge, for it has been well said that 'there is more wastage through under-application of what is already known than through delay in elucidating the unknown.' (*Chemistry and Industry*, July 26 1958.) These activities might well form the subject for future lectures.

The Shawbury Curometer‡

A DYNAMIC TESTER FOR FOLLOWING THE CURE OF RUBBER

By A. R. MORE,* S. H. MORRELL† A. R PAYNE†

SUMMARY

This preliminary paper describes a simple form of dynamic test machine which is used to indicate the change of dynamic modulus continuously during the curing of a rubber vulcanizate. The equipment is a simple mechanical device to operate and use, and the results correlate with tensile modulus and hardness measurements. The scorch time of a vulcanizate can also be obtained from the 'Curometer.'

THE use of dynamic measurements for the testing of rubber is becoming increasingly popular. Recently, J. Peter and W. Heidemann (Kaut. u. Gummi, 1957, **10**, WT 168-172) have developed instruments in which they evaluate the characteristics of rubber during vulcanization by measuring the dynamic stiffness. The first of these consisted essentially of an eccentric weight which imposed a sinusoidal shear stress on two rubber test pieces. This stress was measured by a proof-ring, and an optical system projected the stress-strain ellipse on a flat screen. The more recent 'Vulkameter' (*Idem, ibid.*, 1958, **11**, WT 159-161 and *RJIP* 1958, **134**, 756) imposed a sinusoidal strain on the rubber by a rotating eccentric shaft, the resulting stress being measured by a proof ring and a differential transducer. Peter and Heidemann showed that when the dynamic shear modulus was plotted against the time of vulcanization, the peak was sharply defined and occurred at the same cure time as the optimum value of the 300% modulus obtained from tensile tests.

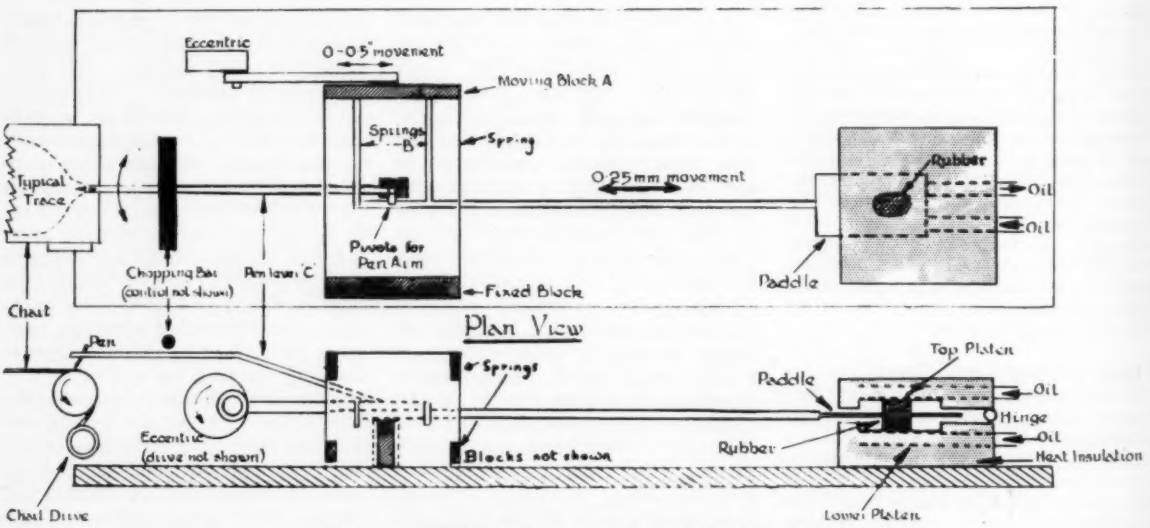

Fig. 1. Simplified diagram of Curometer (*side view*)

A very simple form of dynamic test machine has been developed by the Research Association of British Rubber Manufacturers in conjunction with Messrs H. W. Wallace and Co. Ltd. (Patent Application No. 041577/1958.) Known by the trade name 'Shawbury Curometer,' it is of robust design and is capable of easy maintenance, so that it is eminently suitable for use in the factory millroom.

Description of Apparatus

A simplified diagram of the Curometer is shown in Fig. 1, in which it is seen that the stress is imposed on the rubber by three pairs of leaf springs. The two outer pairs support a block A which is oscillated by means of an adjustable eccentric. To this moving block is attached a third pair of leaf springs (B) which are connected to a horizontal flat paddle. The latter shears a rubber test piece placed on each side of the paddle and heated by contact with the platens, which in turn are heated by oil circulating through a thermostatically controlled bath. A sinusoidal vibration of constant amplitude is applied to the moving block and this causes a corresponding force to be imposed on the rubber through the springs (B).

During vulcanization, the dynamic stiffness of the rubber increases, and so the movement of the paddle decreases. This movement is magnified by a mechanical spring and lever arm assembly (C) and recorded on a rotating drum. A chopping device, above the recording lever, ensures that the pen marks the paper at the two positions of maximum force in each cycle.

A photograph of the *prototype* of the Curometer is shown in Fig. 2, and a photograph of the lower platen and a rubber test sample in Fig. 3. The commercial machine is a much more compact instrument as it has been found possible to rearrange the

*Messrs. H. W. Wallace & Co. Ltd., 172 St. James's Road, Croydon, Surrey.
†The Research Association of British Rubber Manufacturers, Shawbury, Shrewsbury, Shropshire.

‡This instrument will be demonstrated at the Salon de la Chimie, Paris (June 18-29) by the manufacturers in conjunction with Société Française R. W. Greeff & Co.

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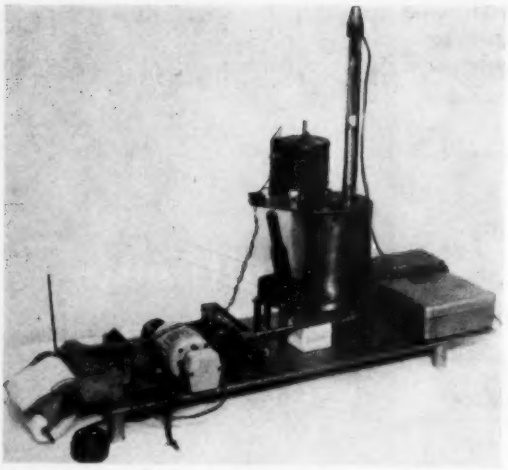


Fig. 2. Overall view of Curometer

electrical controls as well as various mechanical parts.

Experimental Results

It was found convenient in practice to cut pellets from the compounded stock by means of the cutter supplied with the Wallace Rapid Plastimeter.

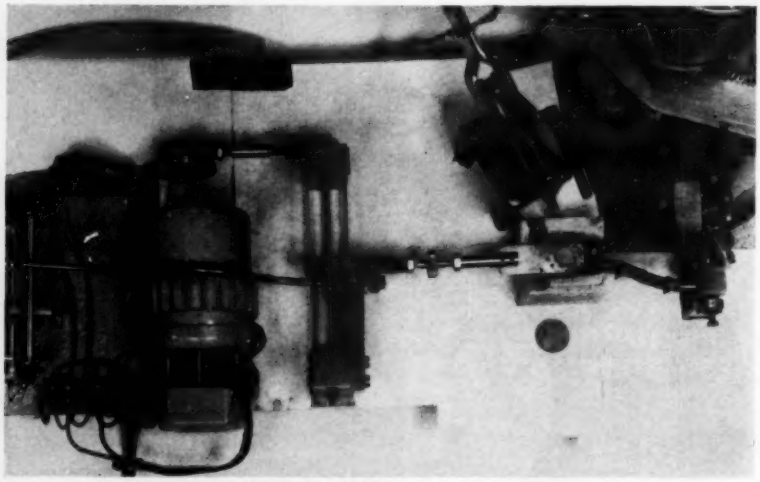


Fig. 3. Detail of springs and paddle

Two such pellets (about 1g.) were placed on each side of the Curometer paddle and clamped mechanically so that a constant thickness of sample was obtained.

A typical trace obtained from the instrument is shown in Fig. 4. The first part shows the initial flow which occurs when the rubber is placed between the hot platens. The second part of the trace shows the beginning of cure, and this continues until the two lines are at the minimum distance apart, which corresponds with the optimum value for the dynamic modulus. Under conditions where reversion occurs, the distance between the two lines will then increase as the dynamic modulus decreases.

A trace obtained at 120°C. and illustrated in Fig. 5 shows the time at which cure commences (scorch time). It is to be noted that only a minute or two is required for the period of initial flow to cease, indicating that the stock soon reaches the temperature of the platens.

A measure of the dynamic stiffness of the rubber can be obtained by measuring the distances between the envelopes of the trace for successive

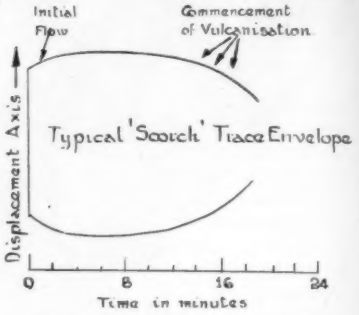


Fig. 5. Typical scorch trace

increments of time (usually two minutes) and plotting against time the reciprocals of these distances on an arbitrary scale. The curves may be fitted to the 300% modulus values obtained in the conventional way (see Fig. 6 and 7) and it is seen that there is a close correspondence. In the same way, the scorch curves can be fitted to the Mooney scorch times, provided that a time adjustment of eight minutes is made (see Figs. 8 and 9). This is thought to be due to the period required to heat the rubber to test temperature in the Mooney plastimeter where the central metal rotor also acts as a heat sink.

Another way of evaluating the results obtained with the Curometer is to compare the times required to reach maximum dynamic modulus with those required for maximum modulus or hardness when conventional test methods are used. Table 1 shows values for a range of rubbers (see Appendix for details of the compounds used).

Discussion of Results

The above results show that in general the changes in dynamic

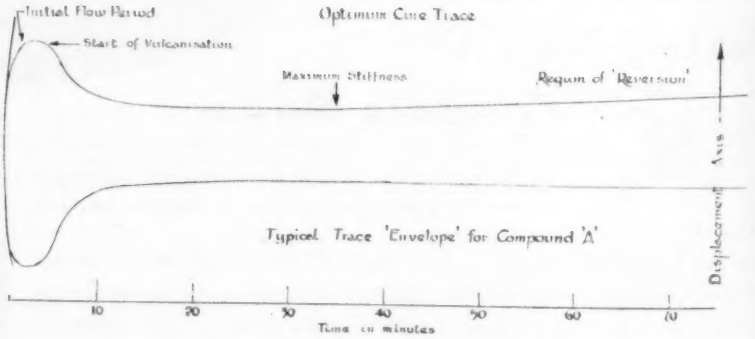


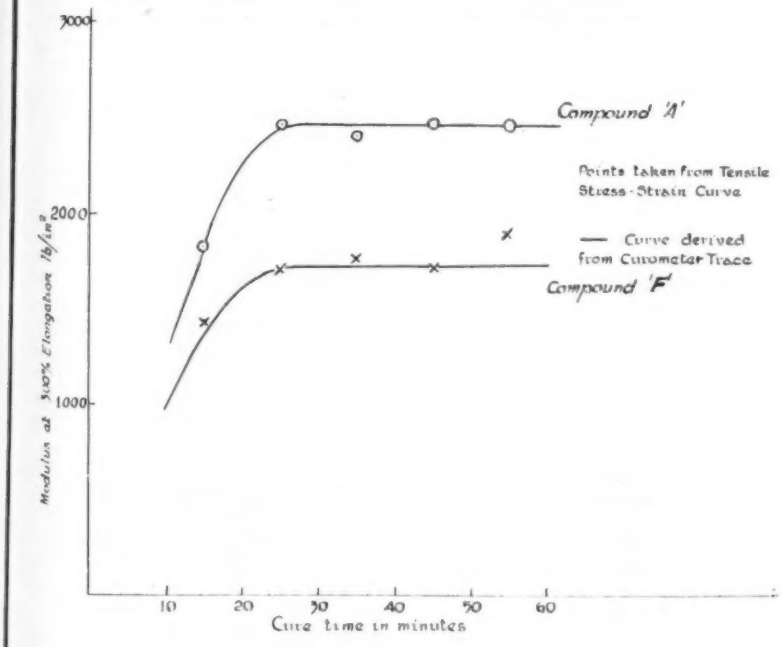
Fig. 4. Typical curing trace

TABLE 1

Property examined	Compound A	B	C	D	E	F	G	H	J	K
Tensile strength ..	25	30	35	30	35	55	20	15	60	15
300% modulus ..	25	35	35	35	35	35	15	20	60	45
Hardness	25	35	35	25	35	25	20	20	70	45
Dynamic modulus .. (by Curometer)	26	34	36	32	36	25	18	22	60	45

modulus as followed by the Curometer agree closely with the changes in 300% tensile modulus. Exceptions can occur, however, as illustrated by compound F (see Table 1 and Fig. 4). In compound J, too (Fig. 7), a different estimate of cure for maximum modulus would have been obtained if the 60-minute cure had given an erroneously low figure. Under such conditions it is felt that the continuous trace given by the Curometer is a more reliable measure than that given by the five or six points of the conventional test.

In the measure of scorch time, the Curometer gives values comparable with those obtained with a Mooney plastimeter, if allowance is made for the smaller quantity of rubber under test. The shorter period of heating required by the Curometer sample will increase discrimination in scorch times between compounds, particularly where those times themselves are short.



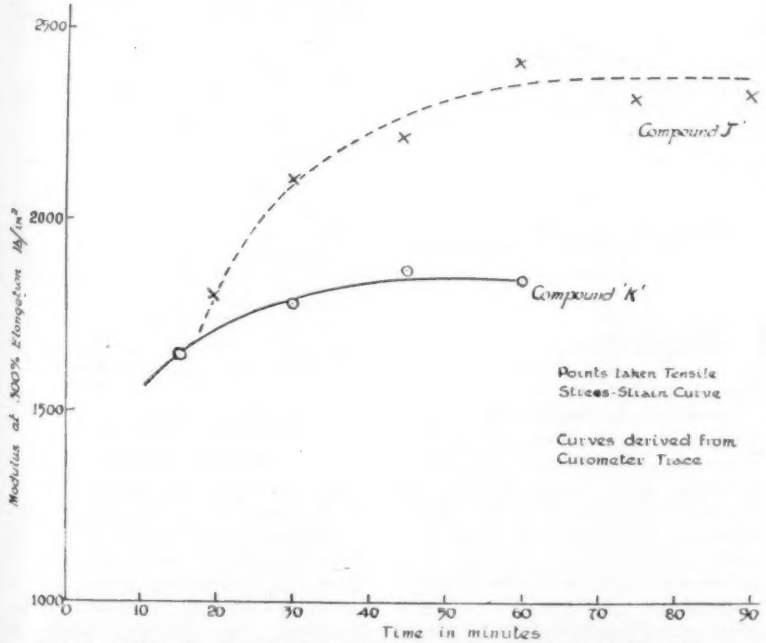


Fig. 6 and Fig. 7. Curing curves compared with 300% modulus values

Value to Industry

The Curometer enables a continuous record to be made of the vulcanization curve of the compound whilst cure is taking place. This takes no more time than that required for the vulcanization itself, and tests may be made on a very small quantity of material. For preliminary experimental work, the compound may be mixed on a micro mill.

Chinese whirlee plates now being sold by Invicta Plastics Ltd., Oadby, Leicester, are moulded in Rigidex high density polythene supplied by British Resin Products Ltd. The whirlee plate is a facsimile of those used for 2,000 years by Oriental jugglers, and spinning and tossing these plates is now becoming a popular pastime in Western Europe

Furthermore, the apparatus is a straightforward mechanical device, which can easily be maintained and operated by relatively unskilled personnel with a minimum of supervision: several machines can be operated by one man, as no attention is needed during the test.

Conclusion

A simple mechanical device has been developed for following the progress of cure of rubber continuously

during vulcanization with much less effort than conventional techniques require, and using only small quantities of material. It is also useful for assessing the relative scorch of vulcanizates.

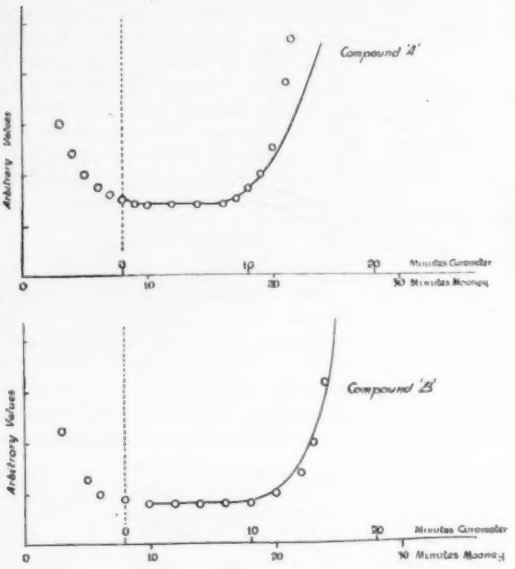


Fig. 8 and Fig. 9. Scorch curves compared with Mooney values (Curometer trace displaced 8 mins. with respect to Mooney)

Appendix

The following compounds were used in this evaluation:—

(A)-(F) a series of natural rubber compounds of tyre-tread type in which the amounts of vulcanizing ingredients have been varied. Curing temperature: 141°C.

(G), (H) two compounds of the direct-vulcanizing type for shoe-soling. Curing temperature: 115°C.

(J) a black-loaded Neoprene WRT compound. Curing temperature: 153°C.

(K) a black-loaded nitrile compound. Curing temperature: 153°C.

	(A)	(B)	(C)	(D)	(E)	(F)
Smoked sheet	100	100	100	100	100	100
HAF black	50	50	50	50	50	50
Petroleum-based softener ..	4.5	4.5	4.5	4.5	4.5	4.5
Stearic acid	2.5	2.5	2.5	2.5	2.5	2.5
Zinc oxide	5	5	5	5	5	5
CBS	0.5	0.4	0.3	0.5	0.5	0.5
Sulphur	2.5	2.5	2.5	2.0	1.5	1.0

	(G)	(H)
Smoked sheet ..	90	90
Polysar SS250 ..	20	20
Aluminium silicate	40	40
Whiting	40	40
Zinc oxide ..	5	5
Stearic acid ..	2	2
MBT	1	1
DPG	0.75	0.75
CBS	0.75	0.75
Sulphur	2	1

	(J)
Neoprene WRT ..	100
SRF black ..	40
Petroleum-based softener	5
L.C. magnesia ..	4
PBN	2
Stearic acid ..	0.5
Zinc oxide ..	5
2-ethylene thiourea	0.75

	(K)
Med. nitrile rubber	100
SRF black ..	100
Dibutyl phthalate	20
Zinc oxide ..	5
Stearic acid ..	2
MBTS ..	1.5
Sulphur ..	1.5

A commercial version of the Shawbury Curometer is now being manufactured by Messrs. H. W. Wallace & Co. Ltd., 172 St. James's Road, Croydon, Surrey, to whom enquiries should be addressed.

First-Aid Boxes

CHANGES in the contents of first-aid boxes or cupboards in factories, and in the advice given on first-aid treatment are provided under a new Order published on May 26 which will come into operation on January 1 1960. It is the First-aid Boxes in Factories Order, 1959 (SI No. 906, H.M. Stationery Office, 3d.), made by the Minister of Labour and National Service under Section 45 of the Factories Act, 1937, and it will replace the current Order made in 1938.

Issued simultaneously is a new leaflet (First Aid, Form 1008, H.M. Stationery Office) which the Order prescribes shall be included in every first-aid box, giving advice on first-aid treatment of injuries arising in factories, in the light of advances made in such treatment in the last 21 years.

Minimum contents for first-aid boxes or cupboards in three categories of factory are specified in the Order.

I.C.I. AT PARIS EXHIBITION

Four I.C.I. Divisions—Dyestuffs, Plastics, General Chemicals and Heavy Organic Chemicals — have stands at the Salon de la Chimie, Parc des Expositions, Paris, June 18-29.

Some of the many existing and potential uses of polyurethane foams, both in rigid and flexible form, are indicated by Dyestuffs Division. One important outlet for the rigid foams which will be emphasized on the stand is for insulation in ships' deckheads, bulkheads and refrigerator holds. A display of fabrics will illustrate the versatility of the 'Nylomine,' 'Duranol' and 'Dispersol' dyestuffs — products specially developed for man-made fibres. A range of pigments, synthetic resins, anti-ozonants and anti-oxidants will also be displayed.

Two products of Plastics Division, 'Butakon' and 'Fluon,' will be on show. These materials, copolymers of butadiene, vary from rubber-like products to hard resins, also as latices or aqueous dispersions, and provide raw materials primarily for the rubber, plastics, paper and leather industries.

'Cereclor' the I.C.I. trade name for a range of chlorinated hydrocarbons—and 'Alloprene,' I.C.I.'s chlorinated rubber, will be shown by General Chemicals Division. The products in the 'Cereclor' range, non-flammable, non-toxic and chemically inert, are used principally as additives for cutting oils and broaching fluids, plasticizer extenders for PVC and flame-retarding additives in plastics such as polythene, polystyrene and polyester resins.

Alkylated phenols, used in the manufacture of detergents, textile auxiliaries, oil additives and varnishes are featured in the display of the heavy organic chemicals division. Also included are a range of plasticizer alcohols, and the 'Topanol' range of anti-oxidants. These anti-oxidants provide an effective means of counteracting many forms of destructive oxidation. I.C.I. catalysts, made by Billingham Division at Clitheroe, Lancashire, are also featured.

Rubber Proofers' Association

At the annual general meeting of the Rubber Proofers' Association held in Manchester on May 14 1959, the following officers were elected for 1959–60: Chairman, Mr A. N. Haworth, Ferguson Shiers Ltd.; vice-chairman, Mr Arthur Tonge, J. Mandleberg and Co. (Rubber) Ltd.

The Analysis of Plastics

INTRODUCTORY SURVEY AT NCRT

THE first of a series of six evening lectures on 'Analysis of Plastics' was given on April 29 at the National College of Rubber Technology by W. C. Wake, M.Sc., Ph.D., F.R.I.C., F.I.R.I., Head of the Chemistry Division, Research Association of British Rubber Manufacturers. The title of the course, said Dr Wake, covered three entirely different types of analytical work. These were (i) qualitative analysis of unknown materials, *i.e.* the identification of plastics, (ii) quantitative analysis of a known material, *e.g.* the determination of chlorine in PVC, and (iii) quantitative analysis of compounded polymers, *i.e.* by determination of some or all of the constituents.

The identification of an unknown material probably had all the interest of a detective story. The techniques may vary from flame and test-tube to the latest methods such as gas chromatography. If a mixture of polymers was present, a minor polymeric component may be unidentifiable in the presence of an interfering constituent such as carbon black or wood flour.

Quantitative analysis of a known polymer in a material could always be attempted by different methods in the absence of direct methods, but the precision was frequently poor. There was difficulty with hydrocarbon and oxygenated polymers, particularly in presence of carbon black or organic fillers.

Quantitative analysis of compounded materials was of greatest difficulty. Thorough extraction with methanol, acetone or even water was the key first step. Frequently the result of the analysis was reported, not as percentages of particular chemical entities, but as ash on ignition, insoluble in nitrobenzene and so forth. And with experience a more accurate reconstruction of the sample could be made from such figures than if an attempt was made to estimate individual chemical components.

Equipment and Techniques

After listing the more comprehensive references on analysis, the speaker reviewed useful techniques, firstly those not requiring costly equipment. Saponification was a useful aid to identification, and a requirement in some formal schemes of analysis. The sample should have been extracted, and if not soluble in alcohol or benzene it was refluxed in a finely divided state with alcoholic potash.

Extraction and solubility methods were considered in detail, and the special difficulty in determination of mixed polymeric and low molecular weight plasticizers in PVC was referred to. Pyrolysis was simple and useful for qualitative and quantitative purposes. Incomplete volatibility of the products interfered with its quantitative use for polymers which contain chlorine, bromine or nitrogen. For a number of other polymers, the loss in weight on heating the material in a boat could be used to estimate the polymer present.

Combustion in oxygen was useful, but the estimation of styrene in a butadiene copolymer from carbon/hydrogen ratio was unreliable in presence of other organic material. Iodine values as a measure of unsaturation were not easy to use reliably. It was necessary to check the absence of substitution.

The Parr bomb was useful and relatively inexpensive, for sulphur and chlorine determinations. Gas chromatography and spectroscopy required more expensive equipment and would be the subject of later lectures. UV spectroscopy had not made much contribution except for surface coatings from drying oils.

Simple Characterization

The field was immediately narrowed by simple inspection of the material, for colour and appearance, flexibility, spew lines or sprue pips and smell.

The next step was to test by heat and flame. Here it was safest to remove plasticizer before test by cutting a thin sliver, boiling in a suitable solvent for a minute or two, and drying off the solvent. Here the value of a reference library of known specimens was considerable.

More Comprehensive Schemes

After simple characterization, thorough extraction to remove non-polymeric matter was most important before testing for elements. Then some scheme was used for systematic testing of the remaining possibilities.

In the scheme of Shaw (1944) for resins and plastics, after initial sorting by elements present, differential solubility in a sequence of solvents was used for further sorting of chlorinated materials, or specific tests where halogen was absent. Confirmatory colour tests, such as phenolphthalein from P/F resins, were given where possible.

The scheme of Collins (1955) for plastics commenced with an elements test but also assumed information from burning and heating. A secondary sorting was by differential solubilities but (unlike Shaw) was independent of the elements test. The pooling of information from preliminary examination, the elements test, and the solubility, enabled tentative identification as a particular plastic or one of several. Colour reactions were used to differentiate and confirm.

The scheme of Wake (1958) for rubber and rubber-like plastics was of more limited scope, an elements test after extraction being followed by specific confirmatory colour tests depending on the elements found. To cover plastics, the speaker would use saponification as well as the elements for preliminary sorting, owing largely to the growing importance of alkyds and polyesters in relation to the vinyls.

If an infra-red spectrometer was available, extraction followed by an elements test might be used first, then pyrolysis and examination of the spectrum of the pyrolysate.

Accuracy

The reproducibility of results with rubbers and plastics was lower than in, say, metallurgy. The raw materials were themselves variable. Also there might not be uniform mixture of the components, so that it was preferable if possible to mill the sample before analysis.

Dr Wake concluded by listing the errors that were usual, which as the standard deviation for a single observation ranged from 0.04% on 4% of sulphur by the Carins method to as much as 1.3% for rubber by the direct method.

The lecture was followed by a discussion. It was agreed that certain colour tests were of doubtful value. The Liebermann - Storch and Halphen-Hicks tests were sensitive to colophony, but less reliable for distinguishing other natural resins. Colour tests developed mainly for textiles by the Shirley Institute might be interfered with by other ingredients in plastics.

Sir Thomas A. Wedderspoon, J.P., has been appointed a director of Highlands and Lowlands Para Rubber Co. Ltd.

VIEWS and REVIEWS

DRC May Meeting

RUBBER AGE for April 1959 covered particulars of the 75th meeting at Los Angeles of the Division of Rubber Chemistry of the American Chemical Society announced for May 13 to 15, together with abstracts of the 38 papers to be discussed (*loc. cit.*, Vol. 85, No. 1, pp. 93-102).

'Variability'

Obviously I cannot here refer to more than a few of the papers, and my selection is necessarily limited for a variety of reasons, one of these being the complexity and highly specialized character of many, causing even the abstract of an abstract to be fraught with some difficulty if excessive length is to be avoided. This feature, I have observed, tends to become more and more accentuated with the passage of time.

In any case, selectivity purely or mainly by merit of matter must not, for the reasons given, be regarded as the outstanding feature. However, this attitude must be qualified by the remark that the interest of the reader, in addition to what appears to the author of these notes to be 'comprehensibility without tears'—and space at his disposal—have come to be the abstractor's guide, as he sees it.

The above, then, leads to a few words on paper No. 18A by A. R. Kemp (*Rubber Technology Foundation, University of Southern California*), entitled 'Constitution and Variability of Rubber Foam from Individual Trees.'

Special procedures (described in the paper) for collecting, stabilizing and studying variations have shown that colour, hardness, solubility, intrinsic viscosity and gel content vary widely in the rubber taken from 24 individual trees on a Costa Rica estate. The data so obtained were compared with those for crepe and smoked sheet, and with unpublished data obtained previously on different types of rubber grown in an experimental garden at Miami, Florida.

The author's studies yielded data 'throwing new light on the composite nature of the sol and gel components in rubber.' Light is shown to be the main cause of instability 'of solutions which are very stable in darkness.' It is of interest to note that the results of the present investigation have been compared with studies made by Bloomfield in Malaya 'on rubber latex as directly tapped.'

Liquid Urethanes

'Liquid Urethane Elastomers' is the title of the first feature of the issue of *Rubber Age* quoted above. This paper, by R. J. Athey (Du Pont, Elastomer Chemicals Dept.) bears the description (p. 77) 'Potential production economies and excellent physical properties forecast an important role for liquid urethane polymers.'

Briefly, 'The use of liquid polymers offers a means of making high-quality rubber goods by potentially low-cost processing methods. It is obvious that such a system lends itself to automatic and continuous processing using equipment relatively low in cost compared with conventional rubber processing machinery.'

Paper 6A

At the DRC meeting referred to above, Mr Athey had a communication '"Chemical Compounding" of Liquid Urethane Elastomers' (*loc. cit.* p. 95). The author holds that these materials are well suited for the preparation of very hard vulcanizates which combine hardness with resilience, toughness, and oil and abrasion resistance. They are of interest to elastomer product manufacturers because of the wide variety of mechanical properties obtainable which allows unusual product design.

Paper 6A discusses the effect of compounding and processing variables on the mechanical properties of the vulcanizate. Athey reports in the paper on a systematic study of curing temperature, the amount of curing agent, the use of added diisocyanate, and on the mol. weight of the liquid polymer. The data mentioned have been treated statistically, and the design of urethane compounds for specific applications has been simplified.

Results

The upshot of the author's work is that unusually hard vulcanizates have been obtained, these approaching the properties of plastic resins, but they exhibit resilience, impact strength, and excellent resistance to low-temperature embrittlement characteristics of elastomers.

In the paper published in *Rubber Age* as quoted in the first paragraph of this feature (pp. 77 *et seq.*) a number of interesting figures and other data are given. Thus, for example, when 'Adiprene L' (a diisocyanate) is cured with a diamine, a tensile strength greater than 4,500 psi is obtained, with a Shore A Hardness of 88-92.

Ozone

In the section relating to 'Effect of Ozone on Rubber' at the Los Angeles meeting there were nine papers including four dealing specifically with antiozonants, a subject which seems to be attracting increased attention. Thus we have—2-B on 'Compounding Variables Affecting Antiozonant Requirements' by W. L. Cox (of Universal Oil Products Co.).

3-B dealt with 'The Ozone Resistance of Styrene-Butadiene Rubber at Low Temperatures,' by Richard F. Grossman and Allen C. Bluestein (Research Laboratories, Anaconda Wire and Cable Co.).

4-B was on a 'Method of Screening Antiozonants,' by F. A. V. Sullivan and A. R. Davis (Research, American Cyanamid Co.).

5-B by H. A. Winkelmann (Dryden Rubber) discussed 'The Correlation of Ozone Chamber and Outdoor Exposure.'

6-B on the 'Comparative Performance of Antiozonants in Road and Accelerated Tests in the Los Angeles Area,' by Frank B. Smith (US Rubber; Naugatuck Division), showed some interesting results of a practical character. For example, the chemical N-phenyl-N′-isopropyl-p-phenylene (A) diamine exerts extremely powerful protection against ozone checking in the Los Angeles area.

The value of commercial antiozonants as antioxidants was also studied, and amongst other results indicated was the dual protective value of (A) which should be 'useful in extending the service life of passenger and truck tyres.'

7-B which related to the 'Resistance of Compounds to Outdoor and Accelerated Ozone Attack' was put forward

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

by G. N. Vacca, G. H. Bebbington and R. E. Johnson (Bell Telephone).

8-B on 'Wing-Stay 100' as an Antiozonant,' was a paper by J. C. Ambelang and B. W. Habeck (Goodyear). This paper is a good example (as were most of the others) of a combination of laboratory and service experiments, and also of the probability that the papers here discussed should be of considerable interest when published in full. These remarks also apply to 9-B 'Accelerated Ageing Tests, and Outdoor Performance of Butyl Rubber,' by W. Gleason and D. R. Hammel (Enjay Laboratories); to No. 10 'The Operation of Ozone Chambers in Rubber Laboratories to Minimize Variation in Test Results,' by H. Lowman (Goodyear); to No. 11 concerning 'Ozone Resistance of Rubber Insulations,' by W. H. Couch, G. H. Hunt and O. S. Pratt (Simplex Wire and Cable), and to Nos. 12, 13, 14 and 15. Of these No. 13 on 'Chemical Inhibition of Ozone Degradation of SBR,' emanated from Monsanto Chemical Co., and was in the names of H. W. Hilbourne, G. R. Wilder, J. E. Van Verth and J. O. Harris. No. 14 on 'Ozone Cracking of Rubber in the Los Angeles Area,' was to be presented by A. J. Haagen-Smit (California Institute of Technology), M. F. Brunelle (Los Angeles Air Pollution Control), and J. W. Haagen-Smit.

Finally, we come to No. 15 which discussed 'Factors Influencing the Ozone Resistance of Neoprene Vulcanizates under Flexure,' by R. M. Murray (of the Du Pont Elastomers Laboratory).

Vanderbilt Handbook

Messrs R. W. Greeff have been good enough to send me a copy of the new (1958) edition of the Vanderbilt Rubber Handbook, which compared with the 1948 edition, is, in a number of respects—for example, in connexion with Synthetic Rubbers—a new compilation.

The main sections of this massive volume (620 pages) are sub-divided under the headings: Commercial Natural and Synthetic Rubbers; Compounding Materials and Uses; Compound Properties and Test Methods; Compound Design; Laboratory Examination of Compounding Materials and Rubber Products; Articles of Theoretical Interest; Processing Methods and Equipment; Commercial Rubber Products and Processes; General Information.

Object of Compilation

The Vanderbilt Handbook, broadly, has become so well known that any lengthy disquisition on its general character or objects seem unnecessary. However, the editor, Mr George G. Winspear, in the *Foreword* says 'This Handbook has been compiled to serve as a modern source of technical information for those directly connected with the compounding and processing of rubber and synthetic elastomers in their dry forms. It does not contain information on latex compounds and their uses. That subject is covered comprehensively in a separate publication, the Vanderbilt 1954 Latex Handbook.'

Special Feature

A special feature is that articles on elastomers have been contributed by well-known authorities. Thus 'Natural Rubber' is by Otis D. Cole (Firestone); 'Butadiene-Styrene Rubbers,' is by T. D. D'Janni (Goodyear), 'Nitrile Rubber' has been written by W. D. Parrish and W. H. Schhoenback (Goodrich), and 'Neoprene' by D. C. Thompson (Du Pont). Then, 'Butyl Rubber' is by J. F. Wernersback (Enjay). *Reclaim* is handled by J. M. Ball (Midwest Reclaiming), and 'Polysulphide Polymers' by V. H. Perrine and E. M. Fettes (Thiokol Corpn.). Amongst the more recent synthetics 'Silicone Elastomers' are from the pen of D. P. Spalding ((US) General Electric), and of 'Fluoro Elastomers,' D. R. Wolf (Minnesota Mining) is the author. Needless to say 'Hypalon Synthetic Rubber' emanates from Du Pont—the writer being M. A. Smook—and finally, 'High Styrene Resins' are described by F. L. Holbrook (US Rubber, Naugatuck Division).

Although last on the 'Contents' list the 'General Information' section, covering over 70 pages, forms a valuable well of information re compounding, chemical and physical properties, calculation (conversion tables, etc.), cost data, factors and constants, etc., etc.

The Handbook, inclusive of a useful Index, and many tables and illustrations, covers some 620 pages (ca. 8.3 x 5.3in.). Publication and copyright are by the R. T. Vanderbilt Co. Inc., 230 Park Avenue, New York, N.Y., USA. Printing and 'get-up' are excellent.

Electrical Standards

Mr John Page, Secretary of the Wire and Cable Section of the (US) National Electrical Manufacturers Association, has been good enough to send me a copy of the new NEMA-IPCEA *Omnibus Rubber Standards* issued by the Insulated Power Cable Engineers Association and the National Electrical Manufacturers Association. This 'IPCEA Pub. No. S-19-81 (Third Edition) Nema Pub. No. WC 3-1959,' of which the full title is: 'IPCEA-NEMA Standards Publication Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy' supersedes: 'IPCEA General Specification for Wire and Cable with Rubber, Rubber-like and Thermoplastic Insulations, Second Edition, S-19-81, and NEMA Standards for Rubber-Insulated Power and Control Cable, 49-141.'

(Note: The above Standards Publication was developed by IPCEA and Approved by NEMA.)

Subject Matter

A condensed form of the *Table of Contents* (the latter covering more than 100 pages of tables and data) comprises:

General; Conductors; Insulation; Shielding and Coverings; Cabling, Fillers, Binders and Circuit Identification; Testing and Test Methods; Construction of Specific Types [Pole and Bracket Cable, Non-metallic Neoprene-jacketed Mine Power Cables, Pre-assembled Aerial Cable Using Copper Conductors, and Neutral-supported Secondary and Service Drop Cables]; and Appendices. There are also a *detailed* Table of Contents, a *detailed* listing of appendices, and a *detailed* listing of tables.

(Price $4. Copyright 1959 by IPCEA and NEMA. It is stated that the standards may be copied without change, provided that due credit is given to the Insulated Power Cable Engineers Association (1) and to the National Electrical Manufacturers Association (2). Addresses from whom copies are available are (1) 283 Valley Road, Montclair, N.J., USA, and (of 2) 155 East 44th Street, New York 17, N.Y., USA.)

PHILIP SCHIDROWITZ

Questions Corner—75

(Second Series)

319. What methods are used for determining the electrical properties of plastics?

320. What methods are used for studying the effect of temperature on plastics?

321. What tests are of particular value in connexion with decorative laminates?

322. One method of polymerization is known as precipitation polymerization. What is this process?

(Answers next week)

Answers to Questions Corner—74

315. It is usually necessary, and certainly desirable, to design a screw to suit a particular material-die combination, and obviously more than one type can be recommended. Nevertheless certain typical characteristics are common to the different types. Polyvinyl chloride compounds vary over a wide range from rigid to soft and rubber-like materials. For the latter a fully-flighted screw, with a length-diameter ratio of 11:1 to 18:1 is suggested. The compression ratio is about 2:1 and provision should be made for water cooling. For rigid material somewhat longer screws are recommended but the compression ratio should be slightly lower than this.

For polythene, a full-flighted screw is also recommended, with a length-diameter ration of 15 or 16:1. A compression ratio of not less than 3:1 is desirable. Water cooling is necessary. Cellulosics require a smear head type of screw with a length-diameter ratio of about 2:1.

Polystyrene requires a type of screw similar to that used with cellulosics, but with higher length-diameter ratio of about 21:1 is recommended. Cooling water is the same. Acrylics need a smear head type of screw with a length-diameter ratio of 12:1 to 16:1, and a compression ratio of 2:1.

Polyamides require a fully-flighted screw of a length-diameter ratio of 18:1 and there is usually a short compression zone to allow for the sharp melting point, and corresponding volume change in the material.

316. Carbazoles and acetylene combine catalytically, under high pressures, to form a monomer N-vinylcarbazole which has a melting point of 60-65°C., boiling point 110°C. at 1mm. It is soluble in methanol, ethanol, cyclohexane, carbon tetrachloride, ethyl acetate, etc., and as a monomer is used as a dielectric impregnant for electrical assemblies. The polymer is a grey to light brown thermoplastic which has also good electrical properties which are retained at high temperatures.

Bulk polymerization of pure liquid N-vinyl carbazole by heating (at 85-120°C.) yields a glass clear casting. On the other hand, if emulsion polymerized at somewhat higher temperatures (ca. 100-160°C.) with a peroxide catalyst, the resulting product is a grey opaque polymer suitable for moulding (USP 2,072,465; BP 624,819).

A method is given (USP 2,830,059) for the purification of N-vinyl carbazole, particularly for the removal of sulphur compounds, by heating to a temperature above the melting point, but below 120°C. with a small percentage of an azo compound which gives free radicals on heating.

Polyvinyl carbazole has not found a wide commercial use owing to the fact that it is somewhat expensive and the colour is not very good and neither are the mechanical properties. However, it has been used to some extent for impregnating and polymerizing *in situ* for electrical condensers (Mod. Plast. 1947, *25*, 130, Sept.; Ind. Eng. Chem. 1948, *40*, 2271).

For properties of the German product Luvican polyvinyl carbazole and styrene co-polymers see Mod. Plast. 1946, *24*, 157, Nov.

317. An American Specification ASTMD 1457-57T covers some of the important tests for polytetrafluoroethylene moulding and extrusion powders provided they do not contain any additives. Three types are covered and are differentiated according to the following tests:

Melting Point which characterizes a first order, thermodynamic, phase transition occurring at 327°C. Details of the apparatus are given and the temperature at which the material changes from milky white to grey translucent at the outer edges is taken as the melting point.

Apparent Density where it is pointed out that as the polymer tends to pack, the apparent density can only be measured if the powders are given a standard screening prior to test.

Particle Size is important as the fabrication of PTFE is significantly affected by the distribution of the particle size. The wet-sieve method is advocated, and details are given of the apparatus.

Water Content is determined by drying in a vacuum oven.

Specific Gravity is determined on moulded discs.

Thermal Instability tests measure the decrease in the molecular weight of the polymer after it has been heated for a long period at 380°C. The rate of cooling, once selected, must be constant as this is very important.

Tensile Properties are determined from moulded bars.

318. The important features of a screw extrusion machine may be summarized as follows:

The diameter and length of the screw.—Changes in the length of the screw and of the barrel will alter the rate required for heat to be given to the material so that it will reach the desired temperature. The quantity of frictional heat available will also be affected.

The pitch and thread form of the screw.—The pitch controls the rate at which the material will move forward in the cylinder and also has some effect on the rate of shear. The depth of the thread will affect the capacity of the screw and the amount of frictional heat generated.

Rotation speed of screw.—As will be obvious, changes in the speed of the screw will influence the amount of material carried forward, rate of shear and the amount of heat generated.

Clearance between barrel and screw.—The clearance, or thickness of the gap between the thread and the barrel bore can cause a leakage of material due to the pressure. If the gap, however, is very small there will be a high shear in the thin film of the leaking material and consequently a source of local overheating.

Control of temperature.—The plasticity of the material will vary with the temperature which will affect the output of the machine. Also, it is important to keep the temperature below degradation temperatures of the material being extruded. Control of temperature in the barrel, screw and die are all important.

Breaker plate and die restriction.—Restriction of the flow of the material will depend not only on the plasticity of the material, but on the design of the screw. The breaker plate and die may further restrict the flow.

(More questions next week)

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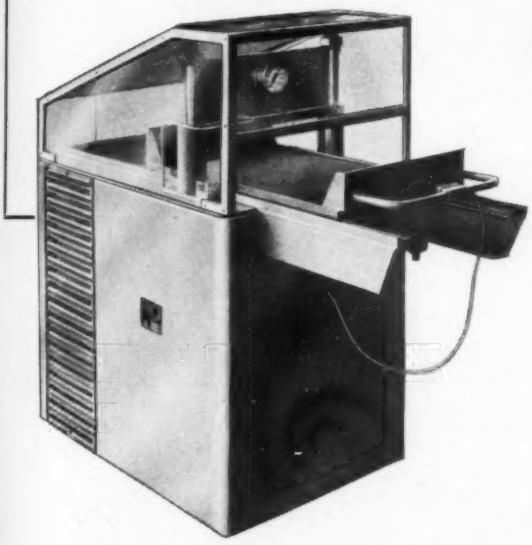

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MEN and MATTERS

A Review of People and Events

by George A. Greenwood

THE contribution of principal interested to us in the recently issued Monsanto Mail 3 is headed 'Plastics Parade,' telling, in a series of pictures with a secondary heading 'Monsanto Products Help to Bring Colour and Design into Everyday Living,' a few of the newer and more varied articles which plastics are now giving us. I shall have something to say about this topic a little later on, but for the moment here are pictures of a graceful skater fixing a pair of polythene guards made by Craxford Mouldings Ltd., arm rests for motor cars made from Lustrex T11 polystyrene with the rest mouldings by Plastic Engineers Ltd., and the *chaise longue* with a glass fibre shell which was featured in a recent exhibition, designed by the Royal College of Arts. In this case, resins used in the shell incorporated phthalic anhydride, maleic anhydride and other chemicals manufactured by Monsanto. The illustration of this is in cinnamon brown, with the *chaise longue* displayed on an attractive patio.

There is another interesting article headed 'Towards the Ideal Home,' which deals with the floating ceilings and extra large wall tiles which were among the plastics features at this year's Ideal Home Exhibition.

Even at the Flower Show!

The Chelsea Flower Show is not precisely the place where you would expect to find EKCO products on show, but there they were last week at the stand of E. K. Cole Ltd. The exhibits included the EKCO watering can, a well-balanced light-weight implement with the container in natural colour polythene and a choice of red or green for the lid and spout. The EKCO lawn sprinkler moulded in polythene, and without detachable parts and the EKCO basket moulded in the same material in green and for garden use such as carrying vegetables, fruit picking, etc., were also on show, and the polystyrene flower holders, available in various sizes, were seen with much interest. EKCO horticultural heating equipment was in evidence.

Plastics Afloat!

More than once in these pages I have referred to the growing use of plastics in the making and the equipment of ships. Another example is forthcoming from an interesting article in *The Financial Times* the other day by Mr T. A. Webb, secretary of The Ship and Boat Builders' National Federation, as part of a fascinating section devoted to small boats and their uses.

Discussing the many changes in boat building materials from, as he says, the days of Noah and the Ark until the second world war, natural timber reigned supreme as the favourite raw material. But see how things have changed even since then!

J. GADSBY, M.A., B.Sc., D.Phil., of I.C.I. Plastics Division who, as reported earlier, has recently been elected chairman of the London and District Section of the Plastics Institute. Dr Gadsby, together with Dr C. L. Child, is to give a paper on the development of plastics materials and methods of processing at the International Conference to be held in Paris in conjunction with the Salon de la Chimie Exhibition, June 18-29

Mr Webb rightly refers to the much greater use, even in the past few years of a marine plywood made to standard, but then he reminds us that the introduction of improved types of resin glues has enabled wood laminates to be used for keels and frames which previously had to be selected from natural grown timber. As we all know this substitution has resulted in greater strength at lesser cost. Then Mr Webb proceeds:

'The most radical change in boat-building methods, however, has been introduced since the last war by the chemist. Various types of resins, by-products of the petroleum industry, have been introduced which, when suitably reinforced by a suitable material such as glass fibre, have enabled the boat-builder to produce craft in this new material up to 50ft. in length, and in plastic boat-building the UK leads the world.'

Incidentally, one of the illustrations to Mr Webb's article is of a fine motor cruiser which makes me quite envious, having enjoyed the sport. It illustrates the 'Bevinda' (described in *RJIP*, January 10 1959), a splendid craft which has a reinforced plastic hull by Halmatic, claimed to be equal to the largest plastic hull yet built. This ship was fitted out at the works of James Taylor (Shipbuilders) Ltd., of Shoreham-by-Sea, for Mr Stephen O'Flaherty, of Mercedes Benz (Great Britain) Ltd.

But to cap everything there now comes news from Moscow that Russia has just launched her first cargo diesel ship made entirely from plastics. It is claimed that the hull of the ship is as strong as any metal, but weighs only one-third of it. The British commentator, I see, has referred to this boat as 'ocean-going.' I hear, however, that it is intended for river service. But probably there is no reason why it should not sail either the Baltic or the Black Sea.

Civic Visit

A comprehensive tour of the distributing division, Hall Lane, Chingford, London, E.4, of the London Rubber Co. Ltd., was made recently by the Mayor and Mayoress of Chingford, Councillor W. W. A. Stewart and Mrs. Stewart. The visitors were, I understand, greatly impressed by all they saw, particularly with the size and design of the buildings.

Webley and Scott

The troubles which our friends on the Board of Webley and Scott, so well known in the plastics world, have been encountering during the past week or two are typical of what is going on so feverishly in the City nowadays concerning take-over bids, real and imaginery. At this moment of writing, Mr A. G. Dennis and my old friend, Mr R. E. G. Windsor,

chairman and managing director respectively, of this newly-wedded undertaking have just again emphatically denied rumours of a bid. The statement continues: 'No take-over bid has been received, and in any event nothing known to us can possibly justify the present price which exceeds by a very considerable amount what we feel to be the present true value. This warning is given in order that genuine investors will not suffer and the present speculative activities are deplored.'

I should say so! These up-and-down movements which have gone on ever since the rumours began may have made money for some people but they have certainly lost money for others. On the day Mr Dennis and Mr Windsor issued their warning, the company's 5s. ordinary shares dropped 3s. 6d. to 22s. 6d., although that is not to say by any means that at such a figure they were over-valued. Quite the contrary.

From what I know personally of Mr Windsor, at any rate, and his business activities over the past 12 or 15 years, he is by no means likely to surrender his interest in the big undertaking which he has done so much to build up.

That Rubber Syndicate

Like a good many other people in this country I have been interested—and intrigued—by the news from Kuala Lumpur the other day that eleven millionaires from Indonesia and Singapore have set up a big syndicate to buy European-owned rubber estates in Malaya. It appears that this despatch was based upon a splashed article in the *Malay Mail* which added that the syndicate has a subscribed capital of more than 200 million Malayan dollars with a provision to raise as much again.

From what I can gather there has been no immediate reaction in London, although it may be a little too early yet to expect bids for British-owned properties. Further messages from Kuala Lumpur say that the formation of the syndicate is intended by commercial circles as a move against fragmentation and sub-division of the big foreign estates. So it would seem, if the syndicate is really intending to own at least 100,000 acres of planted rubber and oil palm to begin with, but for the moment activities appear to have been restricted to the buying of a 3,000 acre estate (I don't know from whom), and the beginnings of a new $250,000 warehouse, which is being put up at Port Swettenham.

The only further comment I would make until we get more substantial news is that this move is not going, apparently, to increase rubber production, but it certainly does give the impression that these great industrialists in the Peninsula believe that conditions there are absolutely safe for long-term investment. We certainly hope so.

The Queen and the Duke with FBRAM

Much was written in the daily Press about that most interesting visit which the Queen and the Duke of Edinburgh paid to the Careers Exhibition at Olympia, which closed yesterday, but from our point of view the highlight of the occasion was the extended call they made at the stand of the Federation of British Rubber and Allied Manufacturers. As we stated last week the Royal guests were received on the FBRAM stand by Mr Jasper Frankenburg, President of the Federation, and both of them, during their stay, which was lengthy, showed the deepest interest in the illustrations and demonstrations of what the rubber industry holds out both to girls and boys.

Mr F. Panzetta, of the Avon Company, who has been acting as stand manager, was with the Queen when she saw the picture of a railway train with a model buffer beside it. Probably thinking how much interested the Prince of Wales would be, she asked how it worked. Mr Panzetta thereupon demonstrated that the buffer head pressed the springs up until the second set of springs came into action, and told her that there was a similar set of springs on the draw-bar hook. Her Majesty then saw that when the train was coupled up, it was like a long spring, with a guard van starting at the same moment as the engine.

Obviously it was all clear to the Queen, who like so many others of her family, has a practical mechanical mind.

The Duke Interrogates

While the Queen was thus engaged with this and other details, the Duke of Edinburgh was engaging himself with other features when he came across Mr Alan Schaffer, a trainee with BTR Industries Ltd. His Royal Highness is, as everybody knows, incurably curious about the occupations and activities of young people, and he put Mr Schaffer properly through his paces. He wanted to know what he did, and when told by Alan that he worked in London as a technologist, he posed the further question 'But what does that involve?' For answer, Alan said that it concerned the process control, and the quality control, of the goods the company makes, whereupon the Duke switched on his questions to the personal side.

In the course of the conversation, Mr Schaffer told him that he had actually been in the rubber industry for two years, before which, for three years, he studied at the National College of Rubber Technology. Asked why he went there, Alan Schaffer replied that he was awarded a scholarship which was provided by the industry.

It looks as though this elicited for the Duke the information he wanted, because he commented 'So you really had a job before you left college?' and Alan replied 'Yes.' He afterwards told the Duke that he had been to Grammar School before going to college.

Mr R. M. Skeet has been elected a director of the Alor Pongsu Amalgamated Estates.

This picture shows Her Majesty The Queen and The Duke of Edinburgh on the Baker Perkins' stand at the National Education and Careers Exhibition which closed yesterday. Left to right after the Duke and Queen are: Mr A. I. Baker (chairman of the board of management), apprentice Paul Hamblin and Miss A. F. Cooke, president of the National Union of Teachers

IRI Foundation Lecture Dinner

LONDON'S TURN FOR SUCCESSFUL OCCASION

THE dinner held by the Institution of the Rubber Industry on the occasion of the annual Foundation Lecture—an event shared in turn by Manchester, Birmingham and London, and last year for the first time Leicester—took place on May 29 at the Café Royal, London. This always notable occasion proved once again a great success.

At the Foundation Lecture given earlier in the evening, a packed house heard Dr J. R. Scott, until recently director of the Research Association of British Rubber Manufacturers and now scientific adviser to the Association, give the fourteenth lecture in the series, his subject: 'Co-operative Research and the Rubber Industry.' (A summary of Dr Scott's lecture appears in this issue on pages 853-4.) Dr Scott was introduced by Mr George Martin, chairman of council, IRI, after the meeting had been opened by Mr C. H. J. Avons, chairman of the London Section, IRI.

Toast of Lecturer

At the dinner which followed, Sir John Dean, president of the IRI, who was accompanied by Lady Dean, presided. The toast of the foundation lecturer was proposed by Mr George Martin who said that they had all had the rewarding experience of listening to a lecture of vital importance to the rubber industry. There was, he added, nothing remarkable about that in itself. They chose their foundation lecturers because of the outstanding contributions they had made to the rubber industry. What made this occasion unique was that the lecture had been given by a man who for over 30 years had been the centre of an organization to which had filtered all details of importance to the development of the industry.

However, said Mr Martin, he did not propose to talk of the work of their foundation lecturer but of Dr Scott the man. Dr Scott had been so immersed in his work over the years that he had not had the time 'to get into mischief like the rest of us.' He had two hobbies, walking—resulting from a desire now and then to get away from it all—and music, in which his tastes were catholic ranging from modern to classic. In this connexion, it was reported that Dr Scott played the piano extremely well. It would be noted that both these hobbies were somewhat solitary occupations.

One of Dr Scott's outstanding characteristics was his imperturbability, Mr Martin continued, and went on to refer to Dr Scott's work on the moderating committee considering questions set for the IRI diplomas. It was typical of Dr Scott's thoroughness that he criticized every question and would often give model answers. Mr Martin referred also to an article in *Nature*. There it was stated that those who had followed the advance of international standardization would realize how much progress had been made by the ISO committee on rubber. This, stated the article, was largely due to Dr Scott. 'His example of patience and understanding of international difficulties serves as a model which could well be served by others.' Mr Martin added that he had himself served on that committee and had wondered sometimes at the time spent and the animation aroused by seemingly trivial matters but always Dr Scott was imperturbable.

In his reply, Dr Scott said he thought that the foundation lecture provided a good pretext for not making a speech after the dinner on the grounds that all had been said in the lecture. However, he wanted to thank Mr Martin for the things he had said and to express his appreciation of the honour conferred on him by being invited to give the lecture. The occasion also gave him an opportunity to thank all members of RABRM staff, and there were quite a number of them over more than 30 years, for all they had done, and to thank the members of RABRM councils and committees for the time they had given so freely. He thought they could look forward to great things at Shawbury under his successor, Dr Watson.

'The Guests'

Mr C. H. J. Avons, proposing the toast of the guests, said he thought that such a speech was the easiest of all to put over, until one came to do it. They had with them a number of distinguished guests including Lady Dean, the wife of their president, Sir Harry and Lady Melville, Dr J. C. Swallow, president of the Plastics Institute, Mr J. V. Crossley, chairman of the publicity committee of the British Plastics Federation, Mr Herbert Rogers, Dr S. S. Pickles and, of course, the ladies.

Reply

In his reply on behalf of the guests, Sir Harry Melville said that the event was for him at least a very special occasion because, besides having had the privilege of hearing Dr Scott, he was also secretary of DSIR and an ex-polymer chemist. He went on to refer in particular to some of the statistics produced by Dr Scott and to his analysis of the financial position of research. The money devoted to the particular type of research they were considering was growing all the time, most of it from industry. This could be embarrassing to DSIR as it meant they had to pay out more and more. However, that was the kind of financial embarrassment he liked. Sir Harry added that their research associations as a whole were spending about 5% of what was spent by private research associations. It was up to industry to see that funds were well spent: the Government gave only an occasional shot in the arm. It was, he commented, a typical British invention.

Sir Harry went on to say that rubber, plastics and man-made fibres had all started in rather a haphazard way. Unity between their technologies had occurred only some 20 years ago. There was not, he said, a clear cut division between rubber, plastics and man-made fibres.

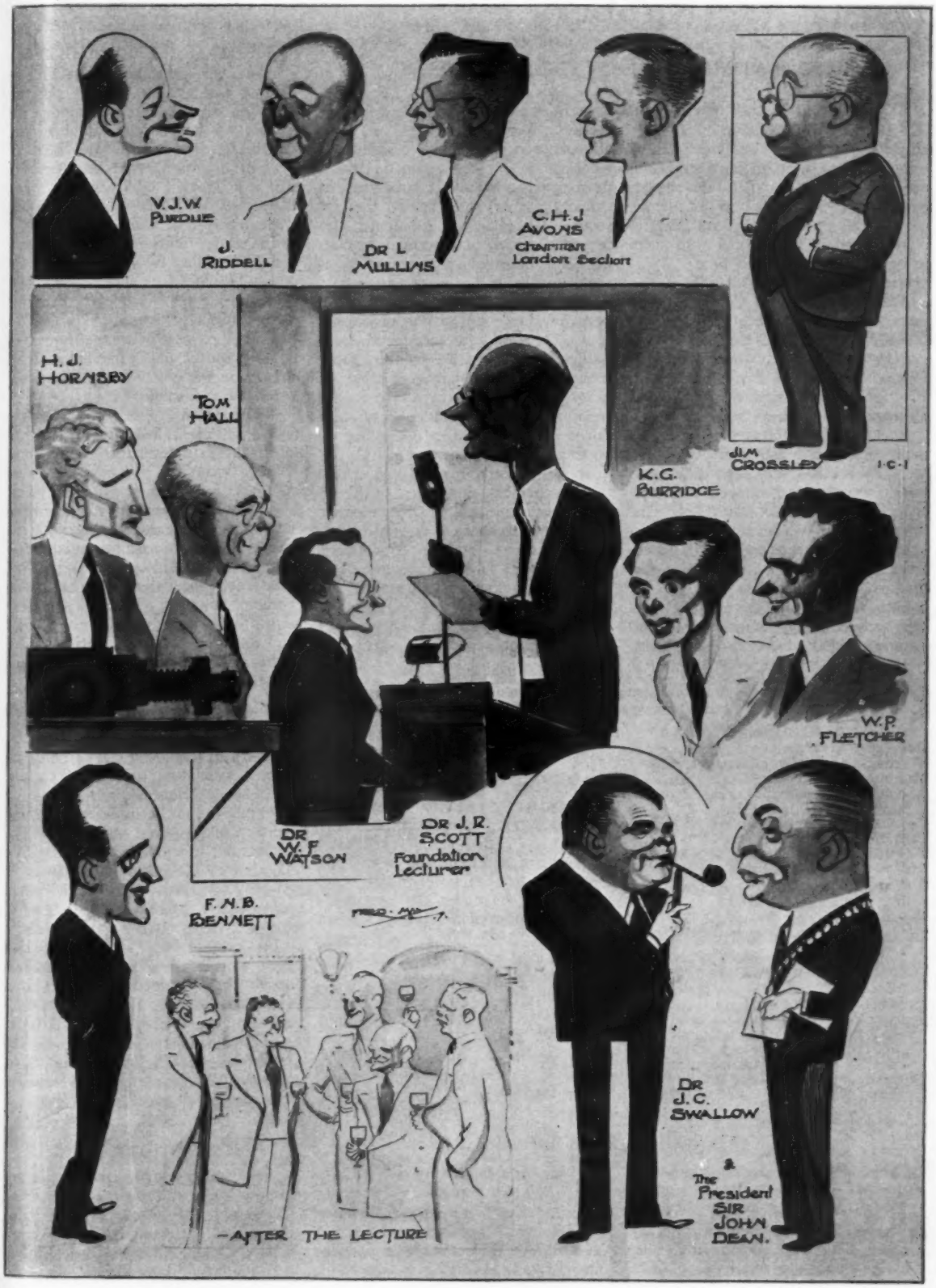
In conclusion, Sir Harry thanked the IRI on behalf of the guests for the welcome they had received.

International Plastics

RUBBER JOURNAL AND INTERNATIONAL PLASTICS stand at the International Plastics Exhibition and Convention — Olympia, London, June 17-27 — will be No. 410, National Hall, first floor.

IFC Tyre Symposium

Owing to pressure on space and the present state of affairs in the printing industry which necessitates an earlier printing date for the Journal, reports on papers given at the Tyre Symposium held recently in Paris are held over.

At the IRI Foundation Lecture and Dinner — — — with Fred May

Ethylene-Propylene Copolymer Rubber

MONTECATINI ANNOUNCE TECHNICAL DATA

MONTECATINI has now issued technical information on its new ethylene-propylene copolymer elastomers. Data given indicate that this new synthetic elastomer—developed by Montecatini and now in semi-commercial production at its Ferrara plant—exhibits exceptional resistance to oxidation, ageing and heat. Wear properties are also outstanding.

The ethylene - propylene copolymers, called by Montecatini C 23, are derived through the use of special catalysts developed by Professor Giulio Natta of Milan Polytechnic Institute for the stereospecific polymerization of alpha-olefins.

According to Montecatini development engineers, the new synthetic C 23 rubber is a very high molecular weight copolymer produced. Its low specific gravity (0.85–0.86g./cm.³) is said to permit specialized applications and to lower the cost of finished articles by giving more product per unit weight of material.

The overall properties of C 23 are reported to be very near to those of natural rubber and in many areas surpass those of conventional synthetics. Rebound at 20°C. is 75% (Luepke pendulum). Its minimum is reached at −35°C. Brittle point (measured on standard apparatus) is statedly remarkably below that of natural rubber. The copolymer also possesses excellent electrical insulating and thermal characteristics as shown in Table 1.

Vulcanization formulations have been developed permitting processing of C 23 with equipment and techniques in standard use by the rubber industry. The company states that the new synthetic rubber can be mixed with normal fillers and can be produced in various grades depending on application requirements.

It can be seen from Table 2 that the mechanical properties of C 23 vulcanizates lie in an intermediate range between those of natural rubber and butadiene - styrene copolymers. Because of its saturated structure and chemically inert nature, however, the material has outstanding resistance to heat, oxygen, ozone and other ageing and degrading agents.

TABLE 1

Properties of raw copolymer as compared to natural rubber and styrene-butadiene synthetic rubber

Properties	C 23	NR	SBR
Heat capacity (cal./g.°C.)	0.52	0.45	0.47
Thermal conductivity (cal./cm. sec. °C.)	8.5×10^{-4}	4.5×10^{-4}	5.3×10^{-4}
Thermal diffusivity (cm.²/sec.)	1.9×10^{-3}	1.1×10^{-3}	1.2×10^{-3}
Thermal coefficient of linear expansion (increase in length/unit length °C.)	1.8×10^{-4}	1.7×10^{-4}	1.8×10^{-4}
Volume resistivity, 20°C. (ohm. cm.)	10^{16}	10^{15}	10^{15}
Dielectric strength (Volt./mil)	700	500	600
Dielectric constant at 20°C. and 1 kc.	2.2	2.6	2.9
Loss factor at 1 kc.	1.5×10^{-3}	2.3×10^{-3}	3.2×10^{-3}

TABLE 2

Mechanical properties of C 23 vulcanizates as compared to that of natural rubbers and SBR. Reinforcement: 50 phr HAF

Mechanical properties	C 23	NR	SBR
Tensile strength (ASTM D412-51T) lb./sq. in.	3,600—4,000	4,100—4,400	3,700—3,900
Elongation at break (△L/L %)	450— 500	550— 600	400— 450
Stress at 300% elongation lb./sq. in.	1,300—1,700	1,600—1,700	1,650—1,900
Tension set; test specimen stretched at 200% elongation, bar kept at said strain for one hour; measurement one minute after releasing in %	7—9	6	9
Hardness: Shore A	60—65	65	67

Canadian Tyre Sales

Canadian production and sales of pneumatic tyres in the first quarter of 1959 were at a record level for the period, says the Rubber Association of Canada. Production was 2,427,134 units—an increase of 44% from the first quarter of 1958. Sales were 1,880,489 (up 29%). Passenger car tyre sales were 1,550,575 units, up 28%; truck and bus tyres 225,533 units, up 33%; tractor and implement tyres 83,973, up 28%.

New FBRAM President

FORECASTS KEENER COMPETITION

MR H. G. W. CHICHESTER-MILES, chairman of the Empire Rubber Co. and of Rubber Bonders Ltd. has been elected president of the Federation of British Rubber and Allied Manufacturers for 1959–60. Vice-presidents for the same term are Mr S. D. Sutton, of Veedip Ltd., and Mr C. H. M. Baker, of the Firestone Tyre and Rubber Co. Ltd.

In taking office after the annual general meeting of the Federation on May 28, Mr Chichester-Miles said that during the next two years the rubber industry would be facing the challenge of keener competition both in the domestic and in the international field. He was convinced that it would meet that challenge.

There was every indication that the worst of the difficulties which had confronted the industry on the home market during the past two years were now over. Abroad, in spite of a recession in world trade, the rubber industry still continued to increase its exports. In terms of money the percentage increase last year over 1957 was small—no more than 1½%. In volume, however, it was 8%—a clear indication that by raising productivity and lowering costs the British rubber industry could more than hold its own on the markets of the world.

US Stockpile Legislation

Thirteen Senators have sponsored a new legislation to ensure that the $1,000m. Defence Production Act stockpile cannot be liquidated without prior Congressional approval. The legislation, introduced by Interior Committee Chairman, Mr James E. Murray, Montana Democrat, would prevent the disposal of a number of strategic items on the open market.

At present, the executive branch does not need prior Congressional approval to unload the inventories acquired under the 1950 Defence Production Act, although approval is required to dispose of some 75 key industrial materials in the basic 'national' stockpile and the so-called 'supplemental' stockpile.

Price's Italian Agents

Price's (Bromborough) Ltd. announce the appointment of Beghe and Chiapetta, Via Isonzo 25, Milan, as the selling agents in Italy for Price's stearines, oleines, fatty acids, cloth and textile oils, and fatty alcohols.

IRI Golfing Society

A MOST successful meeting of the London Section took place on May 7 when the Captain's Prize and the qualifying round of the Wallwork Cup were competed for at Addington. Thirty-eight members were present.

Three competitors tied for the Captain's Prize — Keith Valentine, Len McQueen and Bob Berry. Valentine was declared the winner, followed by Berry and McQueen. These three, who all returned scores of 74 net, therefore qualified to represent the London Section in the final of the Wallwork Cup, together with A. Louden, K. L. Langrish - Smith, Denzil Davies, A. R. Reid, J. Ruffell, Griffiths Hughes, W. J. Garner, E. Ellery and Wilfrid Smith. The next in order of precedence were C. D. Smith, F. W. Brown and Brian Cuzner. The Captain's Prizes consisted of a handsome pair of gold cuff links and other prizes were given by Denzil Davies, H. Whitworth Jones, Angus Reid and Roy Reid.

We had a number of visitors present and our old friend Colonel Wright was again successful in winning the Visitor's Prize, returning a net 75.

When presenting the prizes, the captain expressed his delight at such an excellent turn-out. He reminded the members that the Wallwork final would be held at Hawkestone Park, commencing on June 5, the final being on Monday June 8. He also asked for a good turn-out at the next ordinary meeting of the London Section, which would be held on July 8 at South Herts Golf Club.—H. R. C.

Manchester Section

The Manchester Section of the IRI Golfing Society held the match for the Manchester Challenge Cup, along with its Invitation Day, at the Romiley Golf Club on May 11. There was an excellent turn out of 58 members and guests and some very good scores were returned, especially by the guests.

Many members of the Society's London and Scottish members will be pleased to learn the Manchester Challenge Cup was won by R. N. Ferguson, with a score of 76, after a play-off over the last nine holes against A. Lord and Mr Bolton, each with 76 nett. Mr Ferguson played on this occasion off a handicap of 12, having won it some 23 years ago off a handicap of 6. Perhaps this proves the advantages of the handicap system in golf.

The weather started off hot and sultry but gave way eventually to thunder and lightning and a thorough drenching for nearly everybody. However, after a half hour it cleared and all was well. In the evening 51 sat down to dinner under the chairmanship of Mr S. Heywood, in the absence of Mr H. K. Mills, who was unable to be present. Stanley Heywood, after a short speech welcoming the guests, presented the Cup to R. N. Ferguson and distributed 15 other prizes alternately to the guests and the members.

The following members of the Manchester Section are thanked for the donation of prizes:

T. A. Wilson, British Recovered Rubber and Chemical Co. Ltd.; S. Heywood, Alfred Smith Ltd.; W. A. Kenyon, W. A. Kenyon and Sons Ltd.; Mr Robinson, Henry Gardner and Co. Ltd.; R. N. Ferguson, A. O. Ferguson and Co. Ltd.; H. W. West, West and Senior Ltd.; F. M. Read, British Rec. Rubber and Chem. Co. Ltd.; H. K. Mills, Rubber Regenerating Co. Ltd.; A. F. Sanders, Rubber Regenerating Co. Ltd.; A. F. Whitehead, Whitehead Chemical Co. Ltd.; G. H. Manketelow, Hubron Rubber Chemicals Ltd.; T. R. Waring, Imperial Chemical Industries Ltd.; G. Betts, Joseph Anderson and Sons Ltd.; E. Cheetham, Whitehead Chemical Co. Ltd.; D. Punton, Durham Raw Materials Ltd.—G. C. S.

Scottish Section

The Scottish Challenge Cup and Wallwork Qualifying Outing took place at Kelburne, Largs, on Thursday May 7.

Other than a stiffish breeze, going out conditions were ideal. Members, however, did not take advantage of their good fortune and scores were high but, in all conscience, close enough, with no fewer than six tieing for first place and a further five within three strokes. In the circumstances, it was agreed that the cup and prizes be held over for a play off later in the season.

Scores were as follows:

P. W. Bell	.. ..	82— 4=78
F. S. McElroy	.. ..	83— 5=78
T. W. Davie	.. ..	85— 7=78
L. A. Johnson	..	92—14=78
L. Johnston	.. ..	95—17=78
G. Wilson	.. ..	102—24=78
J. M. Gallie	.. ..	97—17=80
W. Boyd	.. ..	97—17=80
J. Campbell	.. ..	97—17=80
W. S. Alexander	..	89— 8=81
R. P. Yates	.. ..	88— 7=81

After all the stories of stark tragedy and bad luck had been sufficiently ventilated, the annual general meeting was held. T. W. W. Davie was appointed captain for 1960-61, with J. M. Gallie as vice-captain. The secretary agreed to carry on and the committee of Messrs McElroy, Johnson and Pratt was added to by the appointment of P. W. Bell. While the 20 present allowed us six qualifiers, plus the captain and holder, the Section will be fortunate if six manage the trip.

The secretary reported that Messrs R. and J. Dick Ltd. had, through their managing director, donated a trophy for the matches against the Plastics Industry Golfing Society, which have now become a regular feature of the season's programme.—J. M. G.

Patent Specifications

The following information is prepared from published Patent Specifications. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 3s. 6d. per copy (including postage).

Polymerization of Isoprene

No. 813,198. The Firestone Tire and Rubber Co. Application and Filed, September 19 1956. Application in USA, September 19 1955. Published, May 13 1959.

Polymers closely similar to natural Hevea rubber are made by polymerizing isoprene with a hydrocarbon lithium catalyst. The reaction may be carried out by the mass polymerization technique, in which the isoprene, in substantially undiluted form, is contacted with the hydrocarbon lithium catalyst, or by the solution technique, in which the isoprene is dissolved in an inert solvent and contacted with the catalyst. The temperature may vary over a wide range, say from 0°C. or lower, up to 100°C. The isoprene may be in liquid or vapour phase, depending on the temperature and pressure employed. The factors influencing the structure of the polyisoprene and the speed of polymerization are discussed.

Examples are given of the preparation of several hydrocarbon lithium catalysts and their use for polymerizing isoprene. Polyisoprene prepared with pentamethylene dilithium as the catalyst was compared in a vulcanization test with Hevea rubber. Mixes of (a) the pure-gum type and (b) loaded with 50 phr of carbon black were used, and the test results show that the properties of the vulcanized polyisoprene closely approached those of vulcanized Hevea rubber.

Shorter Abstract

Idlers for Conveyor Belts. 808,177. BTR Industries Ltd. Filed, September 14 1956.—In idlers and driven rollers for conveyor belts, the shell is supported from the hub by rubber which is arranged to be in radial shear stress when a radial load is applied to the shell.

Rubber Statistics

YEAR'S TOTALS FOR FRANCE AND JAPAN—BRAZIL—ESTIMATES FOR 1959

THE Secretariat of the International Rubber Study Group has now published details of the rubber position for both France and Japan, for the full year 1958.

France

Imports of natural rubber fell by over 7,000 tons, compared with the 1957 total, to 135,701 tons, including 12,678 tons of natural latex. Vietnam was the principal source of these imports, supplying 60,927 tons, compared with Malaya's 57,291 tons. After allowing for exports of 675 tons, there remained available for consumption 122,348 tons of crude and 12,678 tons of latex. Consumption of natural totalled 139,238 tons compared with the previous year's consumption total of 135,035 tons, and included 12,206 tons of latex, as against 10,425 tons. Stocks of natural on hand at the end of the year stood at 12,876 tons of crude and 1,651 tons of latex.

Imports of synthetic rubber during 1958 amounted to 58,083 tons, an increase of nearly 10,000 tons compared with 1957. Of this total, 36,782 tons came from the USA and 18,056 tons from Canada, the former country being responsible for all the increase in these imports during the year. Consumption of synthetic amounted to 54,788 tons as against 51,350 tons in the previous year, while stocks on hand at December 31 were 8,746 tons.

Japan

Natural rubber imports into Japan during 1958 totalled 129.421 tons, including 10,352 tons of latex, and showed only a slight change compared with the 1957 imports of 130,468 tons. Once again, Malaya supplied the major portion of these imports. Consumption of natural rubber during the year amounted to 117,550 tons of crude and 10,620 tons of latex, the previous year's figures having been 122,015 tons and 8,330 tons respectively. Imports of synthetic rubber increased from 13,764 tons in 1957 to 16,700 tons, the USA supplying 12,829 tons and Canada 3,170 tons.

Brazil

The Comissao Executiva de Defesa da Borracha has now issued the year-end figures for rubber production and consumption during 1958 in Brazil.

Production of natural rubber fell by some 3,500 tons to 20,268 tons, compared with the previous year, and this total included 1,317 tons produced in the form of latex. Imports of natural rubber totalled 17,511 tons, making 37,779 tons available for consumption. The year's natural rubber consumption figure was 42,196 tons, including 1,241 tons of latex, this representing an increase of nearly 4,000 tons over the 1957 figure. Stocks of natural rubber on hand at the end of 1958 totalled 4,083 tons of crude, as against 7,279 tons held at the beginning of the year, and 332 tons of latex; the stocks of crude were held in producing areas (1,124 tons), in consuming areas (1,323 tons) and afloat (1,637 tons).

Imports of synthetic rubber during the year amounted to 1,555 tons, while consumption of synthetic totalled 1,843 tons. Stocks of synthetic rubber on hand at the end of the year had risen slightly to 655 tons, compared with the January 1 figure of 639 tons. During the year 8,449 tons of reclaim rubber were also consumed, while stocks of reclaim on hand at the end of the year amounted to 394 tons.

Estimates for 1959

According to the Press communique issued at the end of the meeting of the Management Committee of the International Rubber Study Group, which was recently held in London, consumption of rubber during 1959 is expected to amount to 3,520,000 tons, the estimated figure for 1958 having been 3,212,500 tons. These totals do not include synthetic rubber produced in countries which do not belong to the Study Group, *i.e.*, mainly Iron Curtain countries, and they assume that Russia and other Iron Curtain countries will continue to buy natural rubber at the same relatively high rate as during recent months, when these markets have been accounting for something like one-fifth of the total world consumption of natural rubber.

The Group also estimated that at least 1,970,000 tons of natural rubber, and possibly considerably more, would be produced, this presumably largely depending on the price which the commodity fetches and which is known to have a considerable effect on smallholder production in certain producing countries, though relatively little effect on estate production. The price is subject to considerable fluctuation as a result of outside influences, not the least of which, as has been reported in recent days, is the rumoured intentions of the US Government with regard to their large stockpile of natural rubber. It is not surprising therefore that the Group was unwilling to be more specific regarding production of natural rubber, while forecasting that production of synthetic would amount to 2,040,000 tons. Again, in view of the uncertainty surrounding the requirements of non-member countries and the effect of recent price movements, the Group decided that it was not possible to estimate as yet the share which natural and synthetic rubber respectively would take of the year's total rubber consumption.

Legs!

All - plastic furniture legs made by a special process developed after much research will be on show for the first time in Britain at the International Plastics Exhibition. Manufactured by the Plastic Mold & Engineering Co. Ltd., the legs have the appearance of highly-polished grained or plain wood and are available in 300 different shades, including browns, blond and ebony

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Rubber Trends

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Information about the June issue from:

THE ECONOMIST INTELLIGENCE UNIT LTD
22 RYDER STREET, ST. JAMES'S, LONDON, S.W.1
Whitehall 1511 Ext. 45

Synthetic Rubber Prices

Prices of synthetic rubbers appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS *in the first week of each month. It will be appreciated if suppliers will give notification of any price changes or additions to their range. Cif duty paid quotations are subject to slight variation due to exchange, ocean freight and insurance fluctuations. Prices are in pence per lb., except where otherwise stated.*

(e-qdp)—Ex-quay duty paid (cifUKdp)—cif UK duty paid (ddp)—Delivered duty paid
(e-sUK)—Ex-store UK (ex-wUK)—Ex-warehouse UK (d)—Delivered

SBR TYPES AND HIGH-STYRENE RUBBER

Ameripol (Goodrich Gulf) (min., 70,000-lb. lots)	(e-qdp)
1000 Hot, Non-Oil	23.10
1001 „ „	23.10
1002 „ „	23.34
1006 „ „	23.34
1007 „ „	23.34
1009 „ „	23.71
1011 „ „	23.71
1012 „ „	23.24
1013 „ „	23.94
1500 Cold, Non-Oil	23.10
1501 „ „	23.10
1502 „ „	23.10
1703 Cold, Oil-Extended, 25% oil	*20.31
1705 „ „ „ „	*20.07
1707 „ „ 37.5% oil	*18.89
1708 „ „ „ „	*18.89
1710 „ „ „ „	*18.66
1712 „ „ „ „	*18.66

* Under 70,000 lb., min. 600 lb.

ASRC (American Synthetic Rubber Corpn.) (carloads lots of 30,000 lb.)	(cifUKdp*)
1000 Hot, Non-Oil	23.99
1001 „ „	23.99
1004 „ „	23.99
1006 „ „	23.99
1009 „ „	24.61
1018 „ „	26.74
1019 „ „	26.26
1500 Cold, Non-Oil	23.99
1502 „ „	23.99
1503 „ „	26.02
3110 „ „	25.78
1703 Cold, Oil-Extended	20.69
1708 „ „	19.27

* US/£ conversion rate $2.80

Cariflex (Shell Chemical Company)	(e-sUK)
S-1000 Hot	22.0
S-1002 „	23.375
S-1006 „	22.0
S-1009 „	24.0
S-1011 „	24.0
S-1013 „	24.0
S-1100 Hot/black	19.75
S-1500 Cold	22.0
S-1502 „	22.0
S-1600 Cold/black	19.625
S-1602 „ „	19.625
S-1605 „ „	19.375
S-1703 Cold, Oil-Extended	20.25
S-1706 „ „	20.0
S-1707 „ „	17.75
S-1709 „ „	17.5
S-1712 „ „	17.5
S-1803 Cold, Oil/Black Masterbatch	17.875
S-1804 Cold, Oil/Black Masterbatch	19.25

Copo (Copolymer)	(cifUKdp)
1006 Hot, Non-Oil	23.25
1500 Cold, „	23.25
1502 „ „	23.25
1505 „ „	26.00
1712 „ Oil-Extended	18.50
1778 „ „	18.75
3900 „ Rosin-Extended	23.125

FR-S (Firestone)	(cifUKdp)*
1000 Hot	23.187
1001 „	23.187
1004 „	23.187
1006 „	23.187
1500 Cold	23.187
1502 „	23.187
146 „	23.187
1703 Oil-Extended	20.125
1712 „	18.5
123 „	19.187
155 „	18.5
173 „	20.125
178 „	18.75
1009 Specialty	24.625
1010 „	25.812
1012 „	24.187
1013 „	24.875
1014 „	27.75
1015 „	28.75
141 „	28.625
158 „	29.562

*US/£ conversion rate $2.80

International Synthetic Rubber Co.	(ex-wks)
Intol 1500	22
Intol 1502	22
Intol 1710	17.5
Intol 1712	17.5

Philprene (Phillips)	(e-qdp*)
1000 Hot, Non-Pigmented	23.28
1001 „ „	23.28
1006 „ „	23.28
1009 „ „	24.69
1010 „ „	25.86
1018 „ „	26.80
1019 Hot, Non-Pigmented	26.33
1100 Hot, Pigmented	19.65
1104 „ „	19.28
1500 Cold, Non-Pigmented	23.28
1502 „ „	23.28
1503 „ „	26.10
1601 Cold, Pigmented	19.56
1605 „ „	19.28
1703 Cold, Oil-Extended	20.23
1706 „ „	19.94
1708 „ „	18.82
1712 „ „	18.58
1803 „ Pigmntd, Oil-Extended	17.78
1805 „ „ „	15.99

*US/£ conversion rate $2.81½

Plioflex (Goodyear)	(fasUSport US Cents per lb.)
1006 Hot, Non-Pigmented	23.25
1500 Cold, Non-Pigmented	23.25
1502 „ „	23.25
1703 Cold, Oil-Extended	20.00
1710 „ „	18.25
1712 „ „	18.25
1713 „ „	16.9
1714 „ „	16.65
1773 Cold, Oil-Extended, Light-Coloured	20.00
1778 Cold, Oil-Extended, Light-Coloured	18.5

Polysar (Polymer UK)	(e-sUK)
S Hot	22
S630 „	22
Kryflex 200 Cold, for Cables	23.5
Krylene „	22
Krylene NS „ Non-Staining	22
Krynol 651 „ Oil-Extended	17.5
Krynol 652 „ „	17.75
SX 371 Process Aid	24

Synpol (Texas-U.S. Chemical Company)	(cifUKdp)
1000 Hot, Non-Oil	23.10
1001 „ „	23.10
1002 „ „	23.34
1006 „ „	23.20
1007 Hot, Non-Oil	23.20
1009 „ „	23.71
1012 „ „	23.24
1061 „ „	23.10
X-274	25.32
8000	23.94
1500 Cold, Non-Oil	23.10
1502 „ „	23.10
1551 „ „	23.10
1703 Cold, Oil-Extended	20.13
1707 „ „	18.71
1708 „ „	18.71
1711 „ „	18.62
1712 „ „	18.48
8200 „ „	18.71
8201 „ „	17.20
8150 Cold, Black Masterbatch	19.46
8253 Cold, Oil and Black Masterbatch	16.20
8254 Cold, Oil and Black Masterbatch	15.83
8256 Cold, Oil and Black Masterbatch	16.33

US/£ conversion rate $2.80

SBR LATICES

Copo (Copolymer) (10-ton lots)	(cifUKdp)
2101 (dry weight)	46.30
X-765 („ „)	40.80
X-800 („ „)	37.20
2102 („ „)	38.00
2105 („ „)	38.00
2110 („ „)	38.00

Naugatex (Naugatuck Chemical International)	(ex-wUK)
2000	39
2001	39
2002	39.5
2006	43
2105	40
2107	40
2108	40
2711	39
2714	39
2733	39
2740	43

Pliolite Rubber (Goodyear)	(d)
2000	40

Latex	
2001 (dry weight)	40
2104 „ „	40
2105 „ „	40
2108 „ „	40
5350 „ „	40

Pliolite Resin (Goodyear)	(d)
101A (dry weight)	44
150 („ „)	50
151 („ „)	35
160 („ „)	50
170 („ „)	50

Hycar (B. F. Goodrich)	(ddp)
2507 (high styrene) dry weight	48

Polysar (Polymer UK)	(e-sUK)
Latex, type II	38.5
Latex, type IV	32.5
Latex, type 721	33.5

International Synthetic Rubber Co.	(ex-wks)
Intol Latex R23	22
Intol Latex M23	22

ACRYLONITRILE TYPES

Butaprene N (Firestone)	(cifUKdp)
NL	52.5
NAA	56.25
NF	51.5
NXM	60.18

Chemigum	(e-s)
N—1	75
N—3A	52
N—5	52
N—6G	45
N—7	45
N—8	45
N600X	45

Hycar (British Geon) (500-lb. lots and over)	(UKd)
1001 High Nitrile Hot	52
1041 „ „ Cold	52
1002 Medium High Nitrile Hot	45
1042 „ „ „ Cold	45

Hycar (B. F. Goodrich) (500-lb. lots and over)	(ddp)
1411 High Nitrile (powder)	66
1432 Medium High Nitrile (crumb)	64
1072 Medium High Nitrile (carboxyl)	66
1312 Medium High Nitrile (liquid)	55
1043 Medium Low Nitrile	51
1014 Low Nitrile	61

LC.I. (min. 5-cwt. lots)	(UKd)
Butakon A-4051 High Nitrile Cold	52
Butakon A-3051 Medium Nitrile High Mooney Cold	45
Butakon A-3002 Medium Nitrile Low Mooney Cold	45

Paracril (US Rubber)	(e-sUK)
18-80 Low Nitrile	63
AJ „ „	50
B Medium Low Nitrile	51
BJ „ „ „	51
BLT „ „ „ Cold	51
BJLT „ „ „ „	51
C Medium High Nitrile	59
CLT „ „ „ Cold	59
CV „ „ „(crumb)	60
D High Nitrile	67
ALT	51

Polysar (Polymer UK)	(d)
Krynac 800 Medium Nitrile	45
Krynac 802 Low „	45
Krynac 803 Medium „ (low Mooney)	45
Krynac 801 High Nitrile	52

ACRYLONITRILE LATICES

Butaprene N (Firestone)	(cifUKdp)
N-300 (dry weight)	53
N-400 („ „)	60.5

Chemigum Latex (Goodyear)	(d)
200 (dry weight)	65
235 CHS („ „)	60
236 („ „)	60
245 B („ „)	52
245 CHS („ „)	52
246 („ „)	52
247 („ „)	52
248 („ „)	52

Hycar (B. F. Goodrich) (dry weight, 3 drums and over)	(ddp)
1551 High Nitrile (large particle)	66
1552 Medium High Nitrile (large particle)	57

Hycar (British Geon) (dry weight, 3 drums and over)	(UKd)
1561 High Nitrile	60
1571 „ „ (carboxyl)	60
1562 Medium High Nitrile	52
1577 „ „ „ (modified)	

ACRYLIC TYPES

Hycar (B. F. Goodrich)	(ddp)
4021 Slab, 500 lb. and over	144
4501 Latex, dry weight	96

BUTYL TYPES

Esso	(e-sUK)
Regular 035	21.75
Regular 150	21.75
Regular 215	21.75
Regular 217	21.75
Regular 218	21.75
Regular 325	21.75
Non-staining 065	22.75
Non-staining 165	22.75
Non-staining 265	22.75
Non-staining 267	22.75
Non-staining 268	22.75
Non-staining 365	22.75

Vistanex (Polyisobutylene)	(e-qdp)
MS Low molecular weight	54
MH „ „ „	54
L-80 Medium molecular weight	54
L-100 „ „ „	54
L-120 „ „ „	54
L-140 „ „ „	54

Polysar (Polymer UK)	(e-sUK)
Butyl 100	21.75
Butyl 200	21.75
Butyl 300	21.75
Butyl 301 (non-staining)	21.75
Butyl 400	21.75
Butyl 101 (non-staining)	26.25
Butyl 402	22.5

Hycar (B. F. Goodrich) (500 lb. and over)	(ddp)
2202 Brominated	68

NEOPRENES

	(e-qdp)
W and WHV (dry weight del)	42.62
WRT („ „ „)	48.37
WX („ „ „)	44.62
GN („ „ „)	44.62
GNA („ „ „)	44.62
GRT and S („ „ „)	45.62
AC („ „ „)	57.125
KNR („ „ „)	75.62
AC'M'and'S' („ „ „)	57.125
CG („ „ „)	57.125
AD („ „ „)	57.125

Latices—Dry (per lb. del, min. 50 lb.)	
571	49.75
842A	49.75
572	51.25
601A	51.87
650	54.125
735	51.25
736	51.25
950	58.25
60	51.87
750	51.25
635	53.62

SILASTOMER

Midland Silicones (500 lb. lots del)	
Stocks	16s. 6d. to 35s.
Pastes	26s. to 35s.
Gums and base stock	36s. to 42s.
Cold-curing silicone rubber	20s. and 23s. 6d.

REINFORCING RESINS AND RUBBERS

I.C.I. (min. 2-ton lots)	(UKd)
Butakon S-8551	36.5
Butakon S-7001	33.5

Hycar (B. F. Goodrich)	(ddp)
2007 (powder)	42.5

Pliolite (Goodyear)	(d)
S—6B	36.5

Polysar (Polymer UK)	(e-sUK)
SS-250 (high styrene) (bale form)	27.25
SS-250 („ „) (flake form)	27.5
Kryflex 252 (high styrene)	25.5

Cyclite (Durham Raw Materials)	42

HYPALON

In 50-lb. bags del UK	71.62

Hints to Business Men

Revised editions of the booklets on France, Peru and the Sudan have been published by the Board of Trade and are available from the Board of Trade, Directories and Notices Section, Room 0348, Horse Guards Avenue, Whitehall, London, S.W.1.

Export Opportunities

Heavy Chemicals and Raw Materials for Australia

The United Kingdom Trade Commissioner at Sydney has advised the branch that Mr R. H. Hay, a director of Edward Caminer Pty. Ltd. of 149 Castlereagh Street, Sydney, will be in the UK from May 1 to June 14 1959. During his visit, Mr Hay intends to seek agencies for heavy chemicals and raw materials for the paint, plastics, rubber, pharmaceutical and allied industries.

Edward Caminer Pty. Ltd. are a firm of manufacturers' representatives who operate on a commission or indent basis and also import on their own account within the limits permitted by the current import control system. They are considered to be a suitable connexion for United Kingdom firms.

Suppliers interested in this agency enquiry should write to Mr R. H. Hay, c/o Board of Trade, Export Services Branch, Room 735, Lacon House, Theobalds Road, London, W.C.1. B.o.T. Reference: ESB/9285/59.

Plastics Working Machinery—Canada

Du Pont of Canada Ltd., Box 660, Montreal, have informed the UK Trade Commissioner at Montreal that production facilities will shortly be completed by them for the manufacture of high density polyethylene resin. In view of this, they are interested in obtaining information about the equipment used to process the resin to the end products. The equipment of particular interest to them at the moment is as follows:

(a) Extruders (2½in. to 6in. with length/diameter ratio 20:1 to 24:1).
(b) Extrusion dies for sheet, strands and tube.
(c) Thermoforming equipment.
(d) Bottle-blowing equipment.
(e) Sheet finishing equipment.
(f) Injection moulding machines (8oz., 16oz., 32oz.).
(g) Flat die chill roll extrusion.

The Montreal firm point out that the local electrical characteristics are 3-phase, 60-cycle, 550-volt or single-phase, 60-cycle, 110-volt.

Manufacturers interested in this inquiry should write direct to the Canadian concern with information, including descriptive literature, and *specimen* prices, *i.e.*, fob price plus an estimate of cif price Montreal, P.Q. and/or Sarnia, Ont., and should notify the United Kingdom Trade Commissioner, 1111 Beaver Hall Hill, Montreal, that they have done so. B.O.T. Reference ESB/9646/59.

The address of the Export Services Branch of the Board of Trade is Lacon House, Theobalds Road, London, W.C.1. Telephone number: Chancery 4411, extensions 776 or 866.

Rubber Markets

LONDON

Prices in the London rubber market fell back sharply on disappointment with the American consumption figures for April and lost further ground subsequently on reported American 'stop loss' orders. The market steadied after this fall but then receded again on lower advices from the East only to rally later. On balance, therefore, it has been an erratic week with prices recording appreciable losses although above their worst levels. The Spot is ⅞d. lower at 29½d. per lb. and falls in forward positions range to nearly 1d. per lb.

Latest prices are as follows:

No. 1 RSS Spot: 29d.-29¼d.

Settlement House:

July 29¼d.-29⅜d.

August 29⅜d.-29½d.

September 29⅜d.-29½d.

October/December 29⅜d.-29½d.

January/March 29¼d.-29⅜d.

April/June 29d.-29¼d.

No. 1 RSS cif basis ports:

June 29¼d.-29⅜d.

July 29⅛d.-29⅜d.

Godown:

June 99¾ Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, July-August shipment, 17s. 9d. seller, cif European ports. Spot, seller, 18s. Bulk, seller, 17s. 4d. Creamed, seller, 17s. 4d. Normal, seller, 13s. 2d.

CEYLON

No. 1 RSS

The price of No. 1 RSS spot at Colombo on June 1 was 125 (126) Ceylon cents per lb.

DJAKARTA

After opening at unchanged levels on June 1, the market eased slightly. Buyers remained very reserved. The close was quiet.

	Rupiahs per kilo	
	June 1	Prev.
Spot No. 1 Priok ..	26.75	26.90b
Spot No. 2 Priok ..	26.00	26.00b
Spot No. 3 Priok ..	25.00	25.00b
No. 1 fine pale crepe ..	24.75	25.00b

Tendency: Quiet

SINGAPORE

The market opened slightly lower on June 1 but steadied during the morning on shortcovering and lack of lower sheet offers. At the higher levels, however, there was renewed profit-taking and the market eased slightly although sellers of lower grades remained reserved. Some upcountry selling early in the afternoon brought the price down to 98 cents per lb. for June where shortcovering held the market. There was fair business done in No. 3 RSS. After-hours, the market closed steadier.

	Straits cents per lb., fob Malayan ports to open ports	
	Close	Previous Close
No. 1 RSS, June..	98⅛- 98¾	98¾- 99
July ..	98⅜- 98⅞	99⅛- 99⅜
No. 2 RSS, June..	97¼- 97¾	97¾- 98¼
No. 3 RSS, June..	97 - 97½	97 - 97½
No. 4 RSS, June..	96 - 96½	96⅜- 97⅛
No. 5 RSS, June..	94½- 95	95 - 95½
No. 1 RSS, Spot..	97⅛- 98⅜	98⅛- 99
No. 3 blanket, thick remilled, June ..	94 - 96	94 - 96
No. 1 fine pale crepe, June ..	101 -103	101½-103½
Thin brown crepe, June	93½- 94½	93½- 94½

Tendency: Steadier.

The Industrial Syndicate quote latex, native produce, 60% centrifugal, packed in rec. drums fob at 196.00d. per gallon.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on June 1 was 32.87½ (32.87½) US cents per lb.

NEW YORK

The following prices ruled in New York on June 1:

DEALERS' PRICES

	US cents/lb., ex-dock	
	June 1	Previous
No. 1 RSS, June ..	35⅛b–35⅜a	35a
July ..	35⅛b–35⅜a	35a
No. 2 RSS, June ..	35⅛b–35⅛a	34⅞a
July ..	35⅛b–35⅛a	34⅞a
No. 3 RSS, June ..	35b –35⅛a	34⅛a
July ..	35b –35⅛a	34⅛a
No. 1 RSS, Spot ..	35⅛b–35⅜a	35a
No. 3 amber blanket crepe, August ..	34⅛b–34⅛a	33⅛a
No. 1 latex, thin crepe, June ..	35⅛n	34⅞n
No. 1 latex, thick crepe, June ..	35⅜n	35⅛n

FUTURES—REX CONTRACT

	US cents/lb.	
	Close	Prev. Close
July ..	35.41t	34.75t
Sept. ..	35.15t	34.45t
Nov. ..	34.80b–34.85a	34.10t
Jan. ..	34.50b–34.65a	33.75b–33.90a
March ..	34.30b–34.35a	33.47b–33.65a
May ..	34.20b–34.25a	33.25b–33.50a
July ..	34.00n	33.10n

Sales: 37. Tendency: Very steady.

Rubber futures were firm up about half a cent per lb. on covering in thin dealings on June 1. Traders said the higher price of shipment offerings and advances in foreign markets buttressed by more active factory interest in physicals have aided the market. Shipment offerings were on a modest scale and dealers were reported to be seeking rubber.

SYNTHETIC RUBBER

The following prices ruled in New York on June 3:

	Cents per lb.	
	June 3	Previous
GR-S, fas New Orleans	23.25	23.25
Neoprene GN, fob Louisville	41	41
Neoprene W, fob Louisville	39	39
Butyl, fas New Orleans	23	23
Paracril, fob Baten Rouge	50	50

AMSTERDAM

The following prices ruled on the Amsterdam rubber market on June 1:

	Guilders per kilo	
No. 1 RMA	June 1	Previous
June	2.82	2.84
July	2.82	2.84
August	2.82	2.84
September	2.82	2.84
July/September ..	2.80	2.84
October	2.81½	2.84
November	2.81½	2.84

Sales: 30. Tendency: Easy.

Goodyear Shoe Products Prices

Goodyear Shoe Products Division is to increase prices of its rubber shoe products owing to the rising cost of rubber, which the company states, can no longer be economically absorbed.

At the same time, the company is able to reduce the cost of certain of its Neolite products and to maintain the prices of other products in this range. This is made possible because of improved production facilities and the fact that Neolite is not appreciably affected by the rising costs of rubber. The changes came into effect as from May 18.

Flying Visit

A party from the Yorkshire branch of the Purchasing Officers' Association recently flew in a specially chartered aircraft from Yeadon Airport to visit the factory of Blue Peter Retreads Ltd. On arrival at Blackbushe, a motor coach was waiting to complete the journey to Basingstoke.

After a comprehensive and instructive tour of the 'Blue Peter' factory, the visitors were entertained to lunch.

Rubber/Colour Masterbatches

Rubber/colour masterbatches are now being manufactured by Hubron Rubber Chemicals Ltd., Albion Works, Albion Street, Failsworth, Manchester. Colour masterbatches are available in powder or masterbatch form and are available as organic and inorganic colours.

Industry INTELLIGENCE

Technical Data

Direct Moulded Footwear Soles

A comparison of accelerator combinations for direct moulded solid rubber soling compounds is reported in Technical Service Bulletin No. 16A/1, issued by Monsanto Chemicals Ltd. (Plastics Division), Monsanto House, 10-18 Victoria Street, London, S.W.1. As a result of preliminary conventional laboratory tests, combinations of DPG with thiazole accelerators and a dithiocarbamate (Ethasan) were selected for evaluation on a CEMA machine under normal operating conditions. Recommendations for a rapid cure on the basis of this practical test are either the combination 0.7 Santocure, 0.7 Thiotax and 0.7 DPG or the slightly more active combination 0.4 Santocure, 1.0 Thiotax and 0.7 DPG. By the limited replacement of part of the DPG with the accelerator Ethasan, even faster cure rates can be achieved.

The bulletin includes a description of the direct moulding of sponge rubber soles on to slippers and of solid rubber soles on to leather uppers, with sectional drawings of the machines used. In addition to the investigation of accelerators, the compounding requirements of direct moulded solid rubber soling in regard to sulphur content, fillers and the use of high styrene resins are discussed. An appendix to the bulletin contains formulations for a sponge slipper sole and solid soles for industrial or army boots, children's shoes (two qualities) and men's or women's shoes (three qualities). The compounds are based on natural rubber or a blend of natural rubber and SBR and all the solid rubber formulations contain a high styrene resin (Tred 85) and a Santocure / Thiotax / DPG accelerator combination.

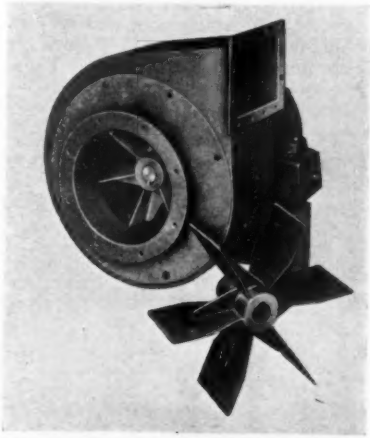
Hardeners for Epoxide Resins

Three new low-cost Bakelite epoxide resin hardeners, DQ 19124, DQ 19125 and DQ 19129, have been introduced. By the use of these hardeners it is possible to formulate epoxide resin/hardener mixes appreciably lower in cost than hitherto. Data for the properties of the resin/hardener systems and suggested uses are given in Advance Information Sheet E32, issued by Bakelite Ltd., 12-18 Grosvenor Gardens, London, S.W.1. Bakelite epoxide resin R 18774 was used in this work, hardeners DQ 19124, DQ 19125 and DQ 19129 being reactive at room temperature with this resin to give resin/hardener systems with pot lives of 15, 30 and 20 minutes respectively. For foundry patterns DQ 19125 is used with R 18774 and a powdered mineral filler such as slate dust or calcium carbonate. Flexible sealing compounds and cable jointing compositions are made by using two hardeners, DQ 19124 and DQ 19116, with resin R 18774, 50 parts of each hardener being mixed with 100 parts of resin. The sealing compound suggested has good adhesion to many surfaces and when first mixed, it is easily trowelled and smoothed into position, in contrast to many earlier epoxide resin formulations.

Machines, Materials and Equipment

Paddle-Bladed Fan Units

New paddle-bladed fan units, specially designed to deal with large and continuous quantities of the heavier dusts, including plastics, and other industrial solids of a clogging nature



are now being manufactured by Bellanger Bros (London), Ltd., 306 Holloway Road, London, N.7. The units can be treated with resistant coatings for most corrosive and chemical fumes, etc.

Plastics in Crayon Boxes

By replacing conventional cardboard formers with contoured polystyrene liners, Boxmakers Ltd. say they have achieved considerable savings in labour and material costs in the production of interiors for coloured crayon boxes. The liners are vacuum formed on a Hydro-Chemie machine which provides continuous output of the intricately contoured mouldings. They are so shaped that each crayon fits neatly into its cell or grove. Finger niches have been moulded into each cell partition so that there is no difficulty in taking out individual coloured crayons. The liners, produced by Boxmakers Ltd. at their Ordsall Lane factory, Manchester 5, are formed from Saroy sheets made with Styron 475 polystyrene. The sheet is available in a wide variety of colours to match the colour scheme of the composite pack.

Publications Received

The Geon Story

The important part now played by PVC in every walk of life is the theme of The Geon Story, an illustrated publication recently issued by British Geon Ltd. More PVC is produced in Britain today than any other plastics material. At approximately 100,000 tons per annum, PVC represents one quarter of the total annual British plastics production (approximately 400,000 tons). Subtitled Everyman's Guide to PVC Plastics, the new publication touches upon the method of manufacture—basically from coal, limestone, water, salt and oil — and goes on to describe how this versatile material is then processed into a wide variety of end-products which are of fundamental importance in many different spheres. This publication has over 40 pages and more than 80 photographs.

Propionaldehyde Data Sheet

Applications of propionaldehyde in almost every segment of the chemical industry are discussed in a newly-revised 12-page technical information sheet now available from the Chemicals Department, Union Carbide International Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17. Propionaldehyde is used in the resin, pharmaceutical, rubber chemical, perfume and flavour, and photographic chemicals industries as an intermediate. It also finds application as an additive in the electrolytic purification of zinc. These uses and other typical reactions are described and documented by 22 selected references to patents and periodical literature. The new bulletin also includes storage, handling, and shipping information as well as physiological and physical properties of propionaldehyde. Vapour pressure and water solubility data are presented in graphical form.

'Terylene Saves'

A booklet entitled 'Terylene Saves' has been issued by I.C.I. Ltd. This year there is no Industrial Textiles Fair in London although there was one last year, at which I.C.I. exhibited. The booklet has been produced as a reminder to visitors to the 1958 fair, and others, of the potentialities of 'Terylene' in modern industry. The uses of 'Terylene' include protective clothing, reinforced V-belts, conveyor belts, fire fighting, trawling, ropes, papermaking, filtration, insulation, etc., all of which applications are outlined with illustrations.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

HERMEPLEX (784,996) For rolls and sheets, all made principally of paper or of paper board or of combinations of paper or of paperboard with metallic foil and films of thermoplastics, and all included in Class 16. By Organization Internationale du Thermosac SC, 71 Forelstraat, Ghent, Belgium. Address for service is c/o Bromhead and Co., St. Paul's Chambers, 19-23 Ludgate Hill, London, E.C.4. To be associated with No. 772,540 (4206, 201). (Class 16; April 22 1959.)

SELA-NUT (784,764) For nuts made wholly or principally of rubber. By the British Screw Co. Ltd., 153 Kirkstall Road, Leeds, 4. To be associated with No. 780,995 (4202, 90) and another. (Class 17; April 22 1959.)

(B781,999) For chemical products for use in industry and in science; plastics in the form of powders, pastes, liquids, emulsions, dispersions and granulates and being for industrial use; and adhesives (not being articles of stationery). By Lacrinoid Products Ltd., Gidea Park Works, Stafford Avenue, Gidea Park, Essex. To be associated with No. B782,000 (4,216, 447) and others. (Class 1; April 29 1959.)

ESCON (782,894) For polypropylene, being a synthetic resin for use in manufactures. By Esso Standard Oil Co., 100 West Tenth Street, Wilmington, Delaware. Address for service is c/o D. Young and Co., 10 Staple Inn, London, W.C.1. (Class 1; April 29 1959.)

AQUARINE (784,932) For synthetic resins in the form of emulsions for use as ingredients in preparing colouring matters for textile materials. By Tennants Textile Colours Ltd., 14 Waterloo Place, London, S.W.1. To be associated with No. 776,710 (4,201, 65). (Class 1; April 29 1959.)

POLYFLOK (783,660) For synthetic high-molecular weight polymeric electrolytes for use in the sedimentation and filtration of the aqueous slurries in ore dressing and the treatment of effluent. By The Yorkshire Dyeware and Chemical Co. Ltd., 24 Lower Basinghall Street, Leeds, 1. (Class 1; April 29 1959.)

HUTEX (786,877) For adhesive substances for industrial purposes and synthetic resins for use in manufactures. By Hubron Rubber Chemicals Ltd., Albion Works, Albion Street, Failsworth, Manchester. (Class 1; April 29 1959.)

NEROL (781,579) For mineral oils derived from petroleum for use in the rubber industry. By The Shell Petroleum Co. Ltd., St. Helen's Court, Great St. Helen's, London, E.C.3. (Class 4; April 29 1959.)

RUGLYDE (783,624) For lubricants for use on rubber. By Marcia Rosen and the Muskegon Bank and Trust Co. (co-executors of the estate of Harold M. Rosen), Marcia Rosen, Florence Rosen, Douglas Allen Rosen and Leo Samuel Rosen, trading as American Grease Stick Co., 2651 Hoyt Street, Muskegon Heights, Michigan. Address for service is c/o Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London, W.C.2. (Class 4; April 29 1959.)

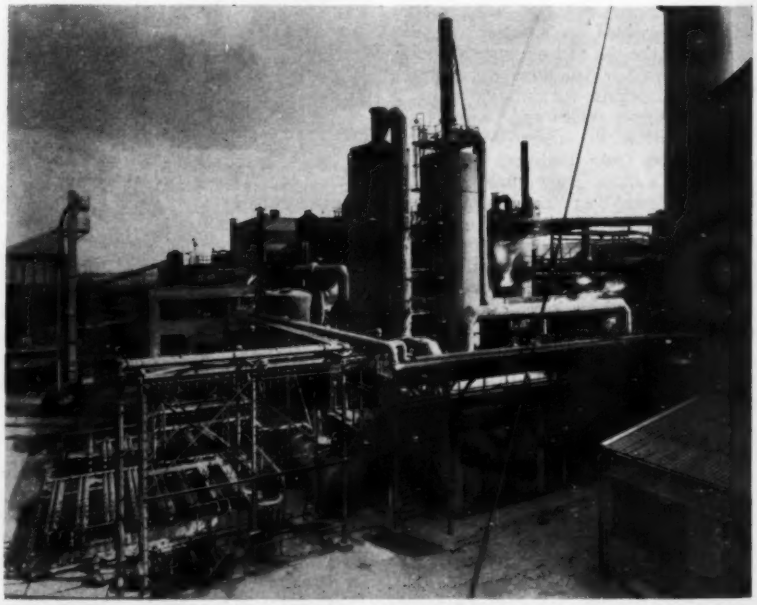
(780,071) For tyres and inner tubes therefor, all for vehicle wheels. By Blue Star Garages Ltd., 35 High Street, Hampstead, London, N.W.3. To be associated with No. 780,072 (4216, 454). (Class 12; April 29 1959.)

NEW COMPANIES

Sho-ad Plastics Ltd. (623,468).—March 18. Capital: £1,500 in £1 shares. To carry on the business of manufacturers of and dealers in polythene products, plastics, etc. The directors are: Henry Shonn, 63 Agecroft Road, East Prestwich; Bernard Shonn, 99 Downham Crescent, Prestwich; Akeeba M. Adler and Isabella Adler. Regd. office: 8 Upper Camp Street, Salford 7.

Kessler Bros. (1959) Ltd. (624,290).—March 26. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in raincoats, mackintoshes, leather garments, etc. The directors are: Harry Kessler, director of Kessler Bros. (M/C.) Ltd., and Mrs. Regina Kessler, both of 6 St. John Street, Salford, 7. Regd. office: 48 Atlantic Chambers, 7 Brazennose Street, Manchester, 2.

Tube Plastics Ltd. (624,260).—March 26. Capital: £10,000 in £1 shares. To acquire the business of fabricating of plastic finished articles carried on by David A. Boughton-Thomas at Stone, Staffs, as 'Plastuform,' etc. The permanent directors are: David A. Boughton-Thomas (managing director and chairman) and Mrs. Caroline E. A. Boughton-Thomas, both of The Steps, Catholic Lane, Sedgley, Staffs; Philip J. Willdigg,



British Titan Products have announced the completion of a major extension to their titanium pigment producing plant at Grimsby. Construction has taken two and a half years and has cost over £2 million. The new project, planned entirely by BTP staff, brings the total output of the Grimsby plant to 70,000 ton/year. It is concerned mainly with the manufacture of the various Rutile grades of titanium pigments, supplementing the production of Anatase grades at the BTP plant at Billingham-on-Tees. Included in the extension is the new plant pictured above, capable of producing 180 tons a day of sulphuric acid

Chase Lane, Tittensor, North Staffs; Philip C. Sawyer, Stonefield House, Stone, Staffs. Regd. office: Cauldon Works, Stone, Staffs.

Fabriform (Plastic Displays) Ltd. (624,282).—March 26. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastics and synthetic materials, display figures and novelties, etc. The directors are: Geoffrey W. Kneen (permanent) and Mrs. Alethea M. Kneen (permanent), both of 31 Old Rectory Road, Farlington; David W. Bowen and Walter F. Tucker. Regd. office: Havant Road, Stoke, Hayling Island, Hants.

COUNTY COURT JUDGMENTS

NOTE.—These Judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the parties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgments are not returned to the Registry if satisfied in Court Books within twenty-one days.

W. HIGGINS, 11 Burwen Drive, Liverpool, 9, Lancs., plastics wholesaler. Stourbridge. £75 10s. 10d., February 20 1959.

BURBANK PLASTICS LTD., 99 Victoria Road, Southend-on-Sea, Essex. Southend. £76 7s. 2d., January 26 1959.

ROCKS PLASTIC FOAM CO. LTD., 71 London Road, East Grinstead, Sussex. Birmingham, £48 8s. 9d. January 22 1959.

PLASTEX PRODUCTS, 2 Harford Street, Liverpool, 3, Lancs. Lambeth, £16 12s. 6d. January 28 1959.

ROWSHUM PLASTIC METALLISATIONS, Doulton Road, Old Hill, Stafford. Norwich, £73 10s. February 12 1959.

CRESTIDE PLASTICS LTD., 40 Portland Place, W.1, London. Clerkenwell. £25 16s. 9d. February 5 1959.

PRESSLAND PLASTICS (firm), 77 Milton Road, Croydon, Surrey, Manufacturers. Croydon. £27. February 25 1959.

PEAK PLASTICS LTD., 6 Gt. Jackson Street, Hulme, Manchester, Lancs. Manchester. £20 6s. January 26 1959.

CYRIL EDWARD PARSONS, 80 Wornington Road, London, W.10, tyre dealer. Mayor's and City. £30 10s., February 27 1959.

W. L. LEADER, trading as Rubber Flooring Co., 123-187 Deptford Church Street, London, S.E.8. Westminster. £105 3s. 3d. February 17 1959.

MARSTON TYRE SERVICE, Marston Lane, Norwich, Norfolk. Uxbridge. £16 12s. 6d. March 12 1959.

PATENT LIST

Printed copies of the Specifications in the following list can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on May 27 1959

Celanese Corporation of America. Cellulose acetate tapes and magnetic recording tapes produced therefrom. 814,020.

Dow Chemical Co. Non-corrosive compositions comprising polymerized olefines. 813,864.

De Bataafsche Petroleum Maatschappij NV. Polyepoxy polyethers, their polymers and derivatives. 813,865.

Dow Chemical Co. Method for forming thermoplastic resinous materials into expanded foam structures and articles thereby obtained. 813,941.

General Tire and Rubber Co. Method and apparatus for applying preformed bands to a tyre building machine. 814,047.

Soc. des Usines Chimiques Rhone-Poulenc. Polymerization of ethylene. 813,880.

Celanese Corporation of America. Vinyl acetate polymerization. 814,068.

Esso Research and Engineering Co. Vulcanization of isoolefin-polyolefin polymers. 813,964.

Technion Research and Development Foundation Ltd., H. Heimann, D. H. Kohn, and I. Zewi. Process for the oxidative polymerization of viscous liquids. 813,885.

De Bataafsche Petroleum Maatschappij NV. Viscometers. 814,155.

Midland Silicones Ltd. Siloxane adhesive compositions. 813,889.

Montecatini Soc. Generale per L'Industria Mineraria e Chimica. Process and apparatus for improving the dimensional stability of fibres obtained from crystallizable propylene high polymers. 813,891.

De Bataafsche Petroleum Maatschappij NV. Hardenable compositions comprising epoxy resins, and a process for curing these compositions. 813,972.

E. I. du Pont de Nemours and Co. Polychloroprene elastomers. 813,976.

COMPLETE SPECIFICATION ACCEPTED

Open to public inspection on June 3 1959

Dunlop Rubber Co. Ltd. Apparatus for method of fitting tubeless tyres. 814,172.

Dunlop Rubber Co. Ltd. Pneumatic tyre. 814,248.

Union Carbide Corporation. Thermoplastic graft polymers. 814,393.

E. I. Du Pont de Nemours and Co. Preparation of carboxyalkylated cellulose ethers. 814,457.

Dunlop Rubber Co. Ltd. Pneumatic tyre and wheel rim assembly. 814,460.

BTR Industries Ltd., S. G. Deaves and H. Ackers. Pipe joint. 814,402.

Dunlop Rubber Co. Ltd. Tubeless tyre and rim assembly. 814,403.

Ruhrchemie A.G. Process for the production of moulded articles or compact masses from polyethylene powder. 814,320.

A. W. Morrison. Pneumatic tyre and wheel assemblies. 814,371.

Ciba (ARL) Ltd. Thermosetting resin compositions and the use thereof. 814,473.

Celanese Corporation of America. Production of alkoxy-esters and of polyolefinic acids and their salts. 814,205.

Marvalaud Inc. Extrusion nozzle. 814,489.

R. Pietrocola and O. Guenzani. Method for the manufacture of composite footwear soles and in particular of soles for shoes and sandals. 814,337.

Dow Chemical Co. Non-corrosive compositions comprising polymerized olefines prepared with certain catalytic metal compounds. 814,495.

Super Mold Corporation of California. Tyre spreader. 814,436.

United States Rubber Co. Device for cutting a continuous strip of elastomeric material. 814,351.

Knapsack-Griesheim A.G. Process for the preparation of acrylonitrile. 814,238.

Latest Wills

Mr Albert Melhuish, of Upalong, Church Drive, Rhos-on-Sea, Denbighshire, formerly of Boldmere Drive, Sutton Coldfield, for over 30 years with the Dunlop Rubber Co. Ltd., who died on January 14 last, left £4,381 gross, £4,316 net value. (Duty paid £166.)

Mr Matthew Atkinson, of Abbots Close Farm, Fir Tree, Crook, Co. Durham, formerly for 35 years a rubber planter in Ceylon, pioneered the interplanting of cocoa palms between rubber trees on rubber plantations in Ceylon, who died on July 22 left £21,874 gross, £21,756 net. (Duty paid £3,294.)

Changes of Name

Gomme Developments Ltd. (452,169), plastic material manufacturers, etc., Spring Gardens, High Wycombe, Bucks.—Name changed to E. Gomme Ltd. on February 12 1959.

Morib Plantations Ltd. (110,852). To acquire and hold shares, etc. 200 Gresham House, Old Broad Street, London, E.C.2.—Name changed to A. Wilson's Stores (Holdings) Ltd., on February 1 1959.

Yadran Ltd. (418,247), 240/6 Maybank Road, E.18.—Name changed to Alpa Plastic Products Ltd. on February 10 1959.

Rubber Journal and International Plastics CLASSIFIED ADVERTISEMENTS

APPOINTMENTS VACANT

6d. a word, Minimum 10/- Box 2/-

CHEMIST required with experience in compounding natural and synthetics and of process control. Several years' proved experience and A.I.R.I. or equivalent preferred. Details in confidence to Long and Hambly, High Wycombe. (55)

MEDIUM-SIZE works in Birmingham area engaged in high-quality mouldings and hose manufacture require departmental manager to take charge of small mixing shop and hose division. A broad experience in the latter is essential. Good salary, non-contributory insurance and pension scheme. Own staff notified. Please reply giving details of experience and approximate salary figure to:—Box 84. (84)

MIDLAND SILICONES LIMITED have vacancies in product sales departments in London for men aged 24-28 years with a science or engineering degree and some commercial or technical experience. Details as under: (1) The rubber sales department engaged in developing new markets and applications for silicone rubber, require a graduate chemist or physicist for duties in the sales office. (Ref. No. 530). (2) A qualified electrical engineer is needed in the electrical and resins sales department engaged in developing new markets for silicone insulation. Commercial experience in the electrical engineering industry is necessary and specialisation in electrical insulation would be an advantage. (Ref. No. 561). Both the above posts would involve some travel at home and abroad and therefore a knowledge of French or German would be an advantage. The salaries and prospects offered are good. The company operates a non-contributory pension scheme and also a house purchase scheme. Please apply by postcard for detailed form of application to:—The Staff Officer, Albright and Wilson (Mfg.) Limited (with whom Midland Silicones Limited is associated), P.O. Box No. 3, Oldbury, near Birmingham. Please quote appropriate reference number. (89)

PLANT development and methods engineer required by established rubber company in close proximity to London. A knowledge of the latest types of tool design and mechanical presses essential. This is an excellent opportunity to join an expanding organisation. A company house would be available to the successful applicant. Replies, in confidence, to:—Box 65. (65)

VACANCY occurs for young rubber technologist having completed National Service, of L.I.R.I. standard. Experience in footwear compound an advantage. This is an opening with good prospects. Applications, which will be treated with confidence, should be addressed to:—Sam Kay Rubber Co. Ltd., Hope Mill, Portwood Place, Stockport, Cheshire. (82)

RUBBER TECHNOLOGISTS

The North British Rubber and US Rubber of America, require senior and junior technologists with experience of mechanical products with particular reference to specialised moulding and rubber or plastic spreading. The wide range of products ensures comprehensive and interesting work. Experience in other products will also be considered. Knowledge of compounding would be an advantage. Attractive salaries will be offered to the selected candidates. Company benefits include a contributory superannuation scheme and free life assurance. The company are also prepared to assist with removal expenses. Applications marked RT, giving full details of qualifications, experience and age should be addressed to:—Industrial Relations Division, The North British Rubber Co. Ltd., Box No. 47, Castle Mills, Edinburgh, 3. (79)

APPOINTMENTS VACANT

(continued)

ASSISTANT TECHNICAL MANAGER

(Rubber Technology)

For a leading firm of rubber and synthetic rubber coaters in the Manchester area.

This is an executive appointment responsible to the chief chemist, offering considerable technical interest and above average and progressive salary, with pension and other benefits. Prospects of advancement are excellent. The Company is expanding and its policy is to fill senior executive appointments from within.

Main duties will include evaluation of materials, preparation of pilot plant and production runs, execution of development projects and dealing with day-to-day practical production problems.

Essential qualifications are sound general education with A.N.C.R.T., A.M.C.T. or equivalent and several years' experience in the rubber coating or general rubber industry. Some supervisory experience would be of advantage. Preferred age 26-35.

Please apply in first instance, quoting reference No. 114, to:—

AA LTD

ASHLEY ASSOCIATES LTD.,
PETER HOUSE, MANCHESTER, 1.
RETAINED TO ADVISE ON THIS APPOINTMENT

Applications in strict confidence. Details of candidates will not be passed to client without candidates' permission. (80)

APPOINTMENTS WANTED

6d. a word, Minimum 10/- Box 2/-

SALES executive conversant with the marketing of latex dipped products in home and overseas markets seeks change.—Box 87. (87)

PRODUCTION manager, 16 years' experience in tyres, moulded mechanicals, coolant hose, bonding, seeks change. Salary required £1,750. Available in 3 months.—Box 85. (85)

ARTICLES WANTED

6d. a word, Minimum 12/6 Box 2/-

SECOND-HAND combining machine for fabrics up to 60in. width. Please state particulars of machine and price to:—Box 86. (86)

WANTED urgently tensile tester for rubber. Du Pont abrasive machine. Geer oven. Full particulars to:—Box 90. (90)

Large user of Belting Duck requires an alternative source of supply. Mainly 32oz. cotton to B.S. Weekly quantities approximately 30,000 lbs. Keenest prices for quarterly contract.—Box 76

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